

amateur radio

DECEMBER, 1972

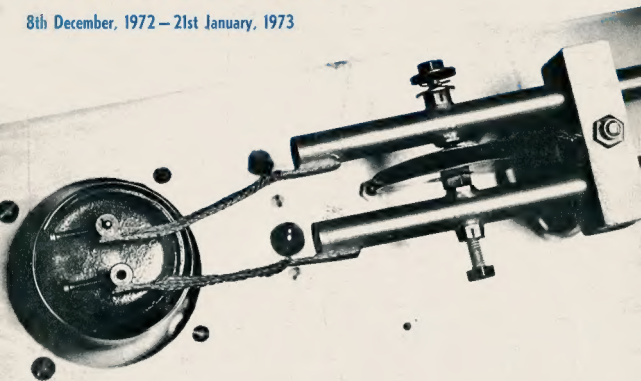
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JOURNAL OF THE AUSTRALIAN INSTITUTE OF AMATEUR RADIO

ROSS HULL CONTEST

8th December, 1972 – 21st January, 1973



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Resistance (ohms): 4K, 100K, 1M, 48 megohms.

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10 to plus 22 db. Dimensions: 4 1/4 x 3 1/4 x 1 1/4

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protected. AC volts: 10, 50, 250, 500, 1000 (10K

o.p.v.). DC volts: 2.5, 10, 50, 250, 500, 1000.

DC current: 50 uA., 5 mA., 50 mA., 500 mA.

Resistance (ohms): 12K, 120K, 1.2M, 12M. dB

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o.p.v.). DC current: 100 uA., 10 mA., 100 mA., 1

amp., 10 amp., 100 amp. Resistance (ohms):

10K, 100K, 1M, 100M. dB scale: minus 20 to

plus 62 db. In-built injector. Blocking oscillator

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HAM

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amateur radio

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COVER

Linear tanks are as much a part of VHF/UHF as is the Annual Ross Hull Memorial VHF/UHF Contest. This summer the contest runs from 1401 hours GMT, 8th Dec., 1972, to 1400 hours GMT, 21st Jan., 1973.

Photo: VK3YAZ and VK3ZU.

"A long and successful life".

That is what is predicted for Oscar 6 which was launched by the National Aeronautics and Space Administration at 1719 hours GMT on 15th October, 1972, from the Western Test Range, U.S.A.

The November issue of "A.R." described the telemetry, command and 2-to-10 metre repeater systems of the package. George Long, the Chairman of the Project Australis Group suggested some of the uses to which the satellite could be put. I propose to suggest some aspects of the significance of Oscar 6.

Oscar 6 is the first truly successful Amateur repeater satellite. It is more sophisticated and more efficient and will operate longer than any previous Amateur Satellite. It therefore represents a further technical advance.

Because it provides an effective repeater system available to all Amateurs it provides a service. Because of its expected life, I am sure that it will attract many Amateurs throughout the world to use techniques and perhaps frequencies that they have not used before. Thus many will acquire new knowledge. Equally, we hope that we shall all acquire new knowledge as to the design and construction of satellites and the phenomena associated with their operation.

OSCAR-6

It's up! Launched 16th October, 6319 hours E.A.S.T. orbit close to that planned: going well. Numerous contacts Australia-wide, also to ZL, VK9, and VK8-ZE. JA's heard. Only major problem—switches itself off, or on, when moving into, or out of, sunlight. Planned to be commanded off, probably mid-week, for three days out of seven for battery re-charging. More data planned for January. "A.R." also listen to Divisional broadcasts, meanwhile watch out for, and report on, ionospheric scintillation when the 6 or 10 metre band is open.

"A SPECIAL FRIEND"

Yes, VK8RV is a special friend, "You may know him, he was general manager of R.S.G.B. (G5ERV) and knows how to try to manage some 16,000 members." (Quote from VK8PG)

RADIO REGULATIONS

N.Z.A.R.T.'s "Break-In" for September announces a special issue in Jan.-Feb. 1973 to celebrate the 50th Anniversary of the Radio Regulations.

LONG, LONG-WIRE AERIAL

W19B's 160 metre DX bulletins No. 1 of 1972/73 (if you want it send him three L.R.C.'s per season) quotes a VK8 S.W.L. (Allen) as having a long wire around his yard on top of a fence about 8 feet high and mounted on insulators. "Has given most excellent account of itself on DX."

STANDARDS ASSOCIATION

The S.A.A. announces a revision being undertaken of the 1959 edition of Part 1 of the S.A.A. Wiring Rules, AS CCI, and invite constructive comments for consideration by the Committee E.L.V.

S.S.T.V.

Listed 22nd in the 3rd World Slow Scan Contest, sponsored by "CQ Elektronika," held in February, was VK8MF, the only VK listed. ("CQ TV" Aug. 1972)

It is significant that Oscar 6 is the outcome of co-operation between Amateurs in a number of countries, primarily the United States of America and Australia. The command system was designed and built in Australia by the W.I.A. Project Australis Group, funded by Amateurs through the Wireless Institute of Australia. We can, therefore, allow ourselves some parochial pride.

But I suggest that the ultimate significance of Oscar 6 is deeper than any of the things to which I have already referred. The Region 3 member of the I.A.R.U. team to the 1971 I.T.U. Space Conference, Tom Clarkson, ZL2AZ, has forcibly pointed out that the use to which the Amateur Service puts its bands is of considerable consequence to the many countries that are undecided as to the worth of the Amateur Service and who express their reservations in their voting at frequency allocation conferences.

The Federal Council of the W.I.A. has encouraged the Australis Project because it believes that this kind of activity is in the long term in the best interests of Amateur Radio. It represents the sort of use of our bands which can justify our continued existence. I congratulate A.M.S.A.T. and the Project Australis Group on their technical success and I also thank them and everyone else concerned with the design, construction, launch, tracking and collation of data for what they are doing for the future of Amateur Radio.

MICHAEL J. OWEN, VK3KI,
Federal President, W.I.A.

QUANDARY

The Publications Committee possesses splendid data, but not for the I.M. T.C.A. 1974 and an excellent article on modifications to the MRE, but with a drawing nearly a yard in length. The problems are being worked on.

EXAMINATIONS

For those interested in this subject many would appreciate a different approach. Here is one of several questions asked in "Tuned Lines" Vol. 1 No. 1 from the N.S.W. V.H.F. and T.v. Group: "Define the universe; give three examples."

U.S. NAVAL RESEARCH LAB.

Celebrates its 50th anniversary this year and acknowledges a great debt to world-wide Amateurs for their assistance over the years. From 1st January to 18th July, 1973, the station WENKF will call "CQ NRL", with concentrated effort from 23rd June to 18th July, using all modes including E.M.E. on 21st January and 1st April on 144.050 MHz. Commemorative QSLs will be sent out as well as a certificate award for successful S.S.T.V. and E.M.E. or for working five or more NRL Amateurs in their circular the N.R.L. mentioned their equipment in the U.S. Fleet's visit to VK/ZL in 1965 operated by Fred Schneider, 1MD of A.R.R.L. Hqrs., as Fleet Radio Officer.

F.M. STEREO

The N.H.K. (Broadcasting Corp. of Japan) f.m. stations (32 in operation late 1972) are required to present 50 per cent. or more of their programmes in stereo and the commercial f.m. stations to include 70 per cent. or more of stereo programmes. (A. Br. Central Board Report on Frequency Modulation Broadcasting)

CALL BOOK 1973: REMINDER

If the P.M.G.'s Department does not have your correct address your listing in the 1973 Call Book will be wrong. You have up to the end of the month to write to them to register your correct listing for incorporation into the new Call Book.

MOBILE MANUAL

An item in "League Lines" of "QST" advises that the A.R.R.L.'s "Mobile Manual for Radio Amateurs" first appeared in 1955. "Over the years shifting interests . . . markedly lessened its usefulness to the Amateur and so it is being discontinued . . . to be effectively replaced by the special repeater manual now in production."

W.I.A. ADDRESS

Please note the Executive's address is P.O. Box 186, Toorak, Vic. 3142. This applies for subscriptions, "A.R." "A.R." address changes, "Magnum" Executive correspondence, Call Book and centralised information. Delays at sea-delivery of mail could occur if any other address is used.

TX IDENT.

In the editorial column of "73 Magazine" for September, Wayne Green mentions the possibility that the F.C.C. seems to be moving towards a system of automatic identification of all transmitters, by means of a built-in IC unit sending out binary blips over a period of 5 milliseconds every time the transmitter was operated.

SUBSCRIPTIONS 1973

At about the time that members receive this issue the subscriptions due notices for 1973 will also arrive. In order to avoid complications which always arise with late payments, please arrange to send in your subscription as early as possible and preferably before the end of the first month of the new year. For reasons of economy both in volunteers' time and in costs, the subscriptions are processed centrally along with membership EOP records. Please remit your subscription, therefore, direct to: W.I.A., P.O. Box 186, Toorak, Vic. 3142. Receipts will not be issued unless requested. Please remember that your last subscription (unless you joined, or were reinstated, during 1972) must be paid financially only up to 31st December, 1972.

I'VE BUILT A MONSTER

S. E. MOLEN,* VK2SG

• In this article VK2SG condenses the results of years of experimenting into a convincing argument for the multi-element, multi-band quad array. He also provides a great deal of practical information on quad construction, and (in a following article) will explain their tuning procedure.

Have you ever wanted to work DX when you wished to, and not when everyone was working it?

Have you ever had the desire to be the only station working real DX instead of just one of the pack trying to get through? Well really, it's not that hard to achieve, if one is willing to do a little work.

To achieve these results one usually thinks in terms of very large aerials. It depends of course on your interpretation of large aerials; to some people a dipole is a large aerial, whereas to others a rhombic is considered as a fair aerial. Of course, one of the considerations is that this aerial must be able to be rotated, and rhombics are sure hard to rotate! Again, the aerial must be a reasonable structure, be reasonably easy to raise in the air and fairly simple to rotate. This is all standard, but what type of aerial to use?

Before I go any further, let me point out that every type of aerial has its advantages and disadvantages, that is, considering both the structural and radiation points of view; while I might concentrate on one type of aerial, some of the structural details will apply equally to any type of aerial, so I hope some of the ideas will be useful to you all.

Fundamentally what we require is an aerial that will operate multiband, give the same gain on all bands and have a simple feed.

If we consider Yagi Antennas we immediately have the problem of multiband operation. Certainly there are multiband Yagis, but, to achieve this, they use traps, and have a variation of gain between bands. Personally, I always think of aerials with traps as rotatable r.f. chokes; maybe they are not that bad, but there are some unnecessary losses in these traps. Minute as these losses may be, they are there, and, to really work DX, every small extra amount of r.f. that you can radiate is that little more signal you can put into the DX station's receiver; and after all, this is what you are trying to do.

We could go through the whole gamut of aerials and point out their good points, but you can read all about these in books on aerials, and whilst we will compare several aerials we will not delve too deeply into them, but use them purely as a comparison.

So having said all that, what are we really trying to say? After much testing and trying various scale models of aerials at 144 MHz. on the aerial test range that I constructed in my back yard (which was luckily large enough to give a good test area), I finally settled for a 4 element quad on a 34 foot boom. This gave the best forward gain for size of any of the aerials, and even gave more gain than some that had much longer booms (and were much harder to tune). The quad also gave a very interesting angle of radiation, and could be tri-band easily.

But before we get involved in building a 4 element quad, let us consider what the other aerials are and why we finished up with the quad.

Firstly, I will describe the antenna range and the equipment that was used to measure the results. I think you will find this of some interest.

All test aerials were mounted at 25 feet above ground, and the aerials were tilted to fire into a corner reflector at 10 wavelengths. The sides of the corner reflector were seven wavelengths long with the dipole spaced 0.25 wavelength (Fig. 1) from the corner. This aerial in itself was subject to considerable testing before it was accepted as a test bed. Across the dipole a detector

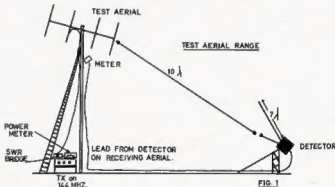
the larger aerials. One could, of course, write up each aerial separately, but I feel that these are adequately covered by various aerial handbooks so I will not write a lot about them, although I will admit some very interesting figures did come from the tests.

Some of the well used two element beams certainly do not give the figures that one hears quoted on the air; for instance the "ZL Special" has been claimed to have 7 dB. forward gain. The best I could get was 4.8 dB. with 20 dB. front-to-back; not as good as a two element quad, and certainly not as good as some of the claims.

Incidentally, trying to add a reflector to a "ZL Special" is lot of fun, but is completely useless! Adding a director gives between 1.3 dB. and 2.1 dB., depending on spacing.

Actually I tested 19 aerials, Delta loops, ZL Special, Yagi, Swiss Quad, Quads in various configurations, W8JK Two-Section, and Lazy H.

Some of these aerials were discarded after the first series of tests, owing to lack of gain, poor back-to-front, or some other problem that does not come into the scope of these tests. Finally, the field was reduced to two aerials, Yagis and Quads. By the way, both the Delta Loop and Swiss Quad showed



was connected and the resultant d.c. voltage was then fed back to the test aerial position, so that the result of any adjustment of the aerial under test could be seen immediately. In this way one person could do all the necessary tests.

The transmitter ran 10 watts input and the output was fed through a power meter then an s.w.r. bridge to the aerial. From this it can be seen that variables were kept to a minimum and could be monitored at all times. It could be argued that firing the antenna downwards might cause false readings to appear in the receiving aerial. In fact, owing to the long "wings" on the corner reflector, there were no ground reflections measurable. By using this set-up, I was able to measure forward gain, beamwidth and angle of radiation.

With the above test range I started to test aerials. Starting with two element beams I worked my way up to

some good figures, but they both had problems that needed further attention, again beyond the scope of these tests.

So comparing Yagis and Quads became the purpose of the operation, and subsequently 2, 3, 4, 5 and 6 element Yagis were tried out, and 2, 3, 4 and 5 element Quads. You will note that while I tested a 6 element Yagi, I did not test a 6 element Quad. There is a reason for this, because while a 2 element Quad has slightly less gain than a 3 element Yagi, the 3 element Quad has slightly more gain than a 4 element Yagi. This does not appear to be so if one reads the various "gain ladders" that appear in some aerial books! But, on actual measurements, the 4 element Yagi showed a forward gain of 8.9 dB. whereas the 3 element Quad gave 9 dB. The 4 element Quad showed 10.4 dB. forward gain, the 5 element Quad 11.8 dB. and the 6 ele-

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ment Yagi 11.7 dB. Considering this, it was felt that we had gone far enough to prove the point, and had arrived at a set of basic figures which could be used as reference throughout further tests.

Having arrived at this point, it was decided to try the Quad Yagi combination. Using a Yagi driven element with a Quad reflector, the results were not very encouraging, and it really only looked like a 2 element Yagi beam. A Quad driven element with a Yagi reflector was only slightly better than a 2 element Yagi, but by stacking the reflectors so that they were parallel to

detracting from the results on any one band, so considering all, let us set out to build a Quad of a size to suit yourself.

KEEPING THE QUAD IN THE AIR!

One hears so much about Quads falling down, that I think I should concentrate on one main theme, and that is, how to make a Quad stay in the air! Fundamentally, if one is to build a structure one does not use glue and string! The same goes for aerials of any kind; one must build them strong enough to stand up to all kinds of

ly to the top of this shaft; there are as many methods as there are aerials, but the main idea is to transfer the downward thrust and rotational torque to as much of the centre shaft as possible, and not to transfer it all to a small welded area. My idea is to use a "T" piece to support the boom as in Fig. 3. This way, the thrust is transferred over a three-foot section of the centre shaft and adds a safety factor.

The boom does not present any problem. For a 2 element Quad we can use 3" x 2" Oregon, for 3 element we can use two pieces of 3" x 2" Oregon in a "T" configuration (Fig. 3a). Or we can use a metal boom, but the metal boom must be as strong or stronger than the Oregon. Of course, the longer we make the boom the more robust it must be, and when one starts thinking of 4 element Quads, one should start thinking seriously of metal booms, as with a long boom the twisting movement becomes important.

To attach the spreaders to the boom I use an angle iron cross as in Fig. 4. I use angle iron in preference to aluminium because it is stronger, if slightly heavier, and after all, it is the strength that we are interested in rather than the weight. The clamps used must be of good quality for they have to stand weather for many years. After trying many types I use 2½" "Ullux" hose clamps, cadmium plated. These are a little more expensive than galvanised, but they certainly last much longer and are worth the extra cost. To get a good grip on the bottom of the canes, the clamped area is wrapped in plastic insulation tape. This tape has a certain amount of compressibility, and in this way the clamps do not shift even after years in the air.

Regarding the spreaders, these are Rangoon Cane. They could be made of fibreglass, which would be excellent, if more costly, but whichever is used, they will need to be treated against weather. I gave the canes four coats of epoxy resin spread over a four-week period, then four coats of white hard gloss exterior enamel. These canes lasted nine years before they were taken down and even after that time, some of them could have been used again.

Treating the canes with fibreglass should be successful, but I have not, as yet, seen any canes treated this way

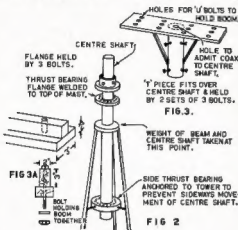


FIG. 3.

FIG 2

the wires of the Quad element, we achieved slightly more gain than expected from a 2 element Quad. Actually, the extra gain was about 0.5 dB. Adding a director in the same form, that is stacked Yagi elements, we should find the gain is better than the 3 element Quad, because of the straight Yagi elements. But, if we consider the mechanical structure, there are certain difficulties that have to be overcome to maintain a stable beam. Of course, we could get rid of the Quad element and replace it with stacked 3 element Yagis, which, of course, is an excellent serial.

But generally speaking, I think that stacking 3 element Yagis will present some mechanical problems that are beyond the scope of the average Amateur. Yagis present difficulties when we try to triband them, and whilst stacked Yagis appear to be an ideal aerial for single-band operation, they do have their problems. The gain of two stacked 3 element Yagis at best twice the gain of one 3 element Yagi, that is 3 dB. more, and for the extra work put into stacking and tuning, I doubt if it would be worthwhile. So we will not go any further into stacking Yagis.

Considering all the foregoing, we seem to return continually to the main features of a Quad; in other words, we have almost the same forward gain as stacked Yagis without the mechanical and matching problems; also we can triband the aerial without any loss of efficiency on any band.

This is not exactly what we set out to prove, but what we were looking for was an aerial which gave us as many good features as possible without

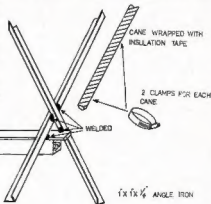
winds. From experiments I have carried out, turning a 3 element Quad in a 60 m.p.h. wind requires a steady pull of four tons in a bicycle chain between 4" sprockets. This is a torque of nearly one foot-ton. In a gusty wind it will be greater, so one must construct the turning mechanism to take this torque, and likewise the centre shaft and bearings. Some of the beam rotators available on the Australian market at the present time are not designed for loads like this, and would, in a very short time, be wrecked trying to hold the beam steady, let alone trying to turn it!

So here is the first point, use the strongest, most powerful rotator that you can find; it may be more expensive for a start, but it will be cheaper in the long run. Secondly, if it can be arranged, use the rotator only to rotate the beam, not to support it. Use a separate support bearing to carry the weight of the beam; then, at the bottom of the shaft, use another bearing to hold the shaft in the centre of the mast (Fig. 2).

Having constructed the centre shaft so that it carries all the weight and yet turns easily, we must now provide a method of mounting the boom secure-



FIG. 4



that look smooth and neat, nor do they seem to last for more than four or five years. Of course, this may be the fault of the people using the fiberglass rather than the material itself. Some people have tried using wooden dowels as spreaders, but these have never been successful, because they are not flexible enough to stand up to the winds and weather, are much too brittle, and will snap at the most inopportune moment, irrespective of how they are treated!

Of course, one could use metal spreaders. A problem, however, if the spreaders are made of one section metal tube, is that the length will be 12 feet from

The size of the wire is your choice, but if one goes to the ridiculous and uses 36 gauge soft drawn copper, one can only expect it to break in the first light breath of air!

CONSTRUCTION

So now we have all the hardware for the Quad and we can start to construct it. This is the point where a lot of people run into trouble, in that they try to construct all the elements at the same time, which will take up considerable space on the ground. Actually the whole thing can be constructed in a 17-ft. square if we use

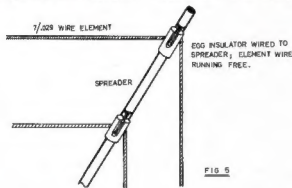


FIG 5

centre to tip and will resonate on 15 metres as well as detracting from the performance on other bands. We can overcome this problem by splitting the spreaders into lengths of 6 feet or less and using a high grade insulation between segments, such as "Teflon". Make sure that all joints are weather tight, and that the metal used for the spreaders has sufficiently high tensile strength to withstand the whipping in the wind. It would be fairly useless to use thin walled soft aluminium tubing, so if you are going to use aluminium make sure it is hard-drawn and has sufficient strength. Because of the mechanical problems associated with the use of metal spreaders I tend to prefer treated cane or fiberglass.

While discussing spreaders, let us consider how we are to attach the wires. If we tie the wires directly to the spreaders and do not allow them to move, we will eventually finish up with broken wires caused by metal fatigue. To overcome this problem, I have used egg insulators wired to the spreaders in such a way that the wires of the elements can run freely through the insulators (Fig. 5), and whilst the Quad lacks a bit of untidy in a heavy wind the wires don't break and the Quad always looks normal after the wind drops, as we want it to do!

For element wire I used 7/0.029 semi hard-drawn copper; this is good substantial wire with a fair flexibility. One could use heavier or thinner wire to suit the circumstances, but do not use hard-drawn or stiff wire. If you want to discover why, try holding some differently annealed wires in a vice and bending them back and forth. You will find that the stiffer wire will always break first, so the more flexible the wire is, the longer it will last.

the space correctly. Instead of constructing all the elements together, if we construct them one at a time, we only need one square area to do the job. If we tie the boom on to the side of the tower at about 11 feet above ground, we can lift each element up on to the boom as we finish it and get it out of the way. This can be a risky procedure, for, if care is not taken, it

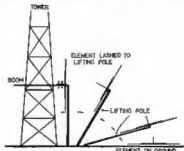


FIG 6

is very easy to break the spreaders and lose the whole element; but if the element is lifted by the centre spider using a light pole, say, 20 feet long, we can lift the element easily and hang it on the boom (Fig. 6). It's as easy as that; as each element is made and hung on the boom, it can be bolted into place, for when we have all the elements constructed we may start our tuning at this height.

Here we arrive at the point, how many elements are we going to use? Let us consider the radiation pattern of various numbers of elements, both in the vertical and horizontal plane. As you can see in Fig. 7, the 2 element Quad has a 60° beamwidth with a 17° (Fig. 8) angle of radiation. It also has 5.8 dB. forward gain, whereas the 3 element Quad has a 44° beamwidth, 12° angle of radiation and a forward gain of 9 dB. The 4 element Quad has a beamwidth of 27°, an angle of radiation of 9° and a forward gain of approximately 10.4 dB. Now if we add another element to make it five, the beamwidth is 20°, the angle of radiation is 7.5° and the forward gain 11.6 dB. [Note: The angle of radiation will also be a function of the aerial height above ground.—Tech. Ed.]



FIG 7 HORIZONTAL PATTERN (Major lobe)

So from these figures you can make up your own mind as to the number of elements you are going to use, and accordingly the size of the aerial you are going to construct.

Regarding the tuning stubs in both the reflector and directors, these may be constructed in various forms, such as inductances or condensers, neither of which I favour, owing to several factors. One is the weight of the coils and/or condensers, another is that the solder joints at these points tend to get brittle after being in the weather for some time under continuous stress. Whereas by using stubs, these are tuned and cut and will not vary due to weathering or break because of movement. After much experimenting, it was found that if we used half the stub in the top of the element and the other half in the bottom, we arrived at a much better electrical balance for the whole aerial. It is not necessary to tune the top stubs provided they are made half the estimated length of the complete stub; then if we tune the bottom stubs we will find that the element will tune as normal with a better electrical balance than is obtainable with only the bottom stubs. If you only use stubs at the bottom of the elements, the quad will still work very well, but it will not be as well balanced, electrically. If you carry out tests you will find that, if you use both top and bottom stubs, the angle of radiation will come down appreciably, depending upon the number of elements you use; but irrespective of the number of



FIG 8 VERTICAL PATTERN (Major lobe)

elements, the lowering of the angle of radiation is worth the effort of putting the extra stubs in your aerial.

So having constructed the reflector and director elements, let us now consider the driven element. This element is the same size as the reflector and directors, but instead of having stubs it is made as a complete loop. Then if we use gamma matching we can feed the element irrespective of its impedance. Also, with gamma matching we can feed three bands with only one feed line and without any peculiar interaction between bands, and still indicate a good s.w.r. on these three bands. The construction of the gamma matching is fairly simple. Fig. 9 is the single-band gamma match. The length of the gamma bar, the size of the condenser, and the spacing of the gamma bar from the element depend on the frequency in use.

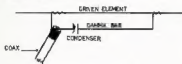


FIG. 9 ONE BAND GAMMA MATCH

Using gamma matches with Quads for more than one band, requires only one feed line if we position it correctly. If we place the feed line half way between the highest and lowest frequency feed points and connect the gamma condensers by an open wire 300 ohm line it will be found that each can be easily tuned. A warning here, do not connect the gamma condensers with co-ax as the capacity of co-ax is sufficient to prevent properly tuning the gamma condensers. If the 300 ohm open wire is constructed as in Fig. 10, the condensers and the gamma bars will all be supported by the 3" x 1" pine which is attached to the boom.

Incidentally, the safest way to lead the feedline down to the shack without it tangling around the mast, etc., is to run it down the centre of the rotating shaft; then you will be able to turn the Quad more than 360° without fear of the co-ax getting caught on the mast and breaking.

That is all the hardware and construction details. All that is left is to give a few measurements. Firstly, the boom length. Most people use an element spacing of 8 feet. Maybe this is fair enough for 10 metres, but if you

are using 20 metres the spacing will be much better at 11 feet 6 inches. This will give a much better beamwidth and slightly better forward gain. As for 10 and 15 metres, this spacing will be slightly more than optimum and thus the gain slightly less, but as the loss is only about 0.3 dB. it is not worrying.

Owing to the increased spacing we have closed the beamwidth by a few extra degrees and therefore the apparent gain at the receiving point could be greater than expected. On tests carried out on the antenna range, it was not until 0.5λ spacing that there was any loss of signal and, even so, this was only about 0.5 dB. At this point, on a two element Quad, the beamwidth is about 50°, so that in effect we have overcome the 0.5 dB loss by increasing the spacing. Of course, after we pass 0.5λ spacing the gain drops rather dramatically, and even though the beamwidth closes further, it does not overcome the loss. As 11 feet 6 inches is less than 0.5λ spacing we do not have this problem, and it is possible to use this spacing for a triband, two, three, or four element Quad, and still obtain better than average results.

The length of the sides of the element varies according to which book one reads! Personally, I use the following measurements:

20 mx	16 feet 9 inches
15 mx	11 feet 4 inches
10 mx	8 feet 7 inches

Gamma Bars:

20 mx	38 inches
15 mx	27 inches
10 mx	18 inches

Gamma Condensers:

20 mx	100 pF.
15 mx	75 pF.
10 mx	50 pF.

Reflector/Director Stubs:

20 mx	} Same length as gamma bars. Half length top and bottom.
15 mx	
10 mx	

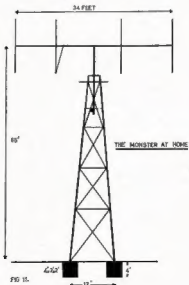


FIG. 11

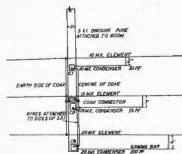


FIG. 12 3 BAND GAMMA MATCH

Finally, to give you some idea of actual performance as compared with a dipole, consistent testing at various times throughout the night and day and allowing for inconsistency in reporting actual S meter readings, has proved that the Quad when "aimed" accurately, gives consistent reports of 26 dB. above the dipole at the DX receiving point which varied from 10,000 to 15,000 miles.

Also, tests carried out against tri-band Yagis, without giving any indication that they were tests (because of the possibility of people trying to help by giving exalted reports) have indicated a consistently better signal by 12 dB. I think this, in itself, speaks for the efficiency of the beam.

One final thought, if you think this is a big beam, well there is at least one much better. On South America to Sweden point-to-point service they use a 25 element Quad on 11 MHz. with a 254-foot boom on a 184-foot tower and they feed it with 50 kW. Now that, I calculate, to have 32 dB. gain, beamwidth of approximately 5° and about 3° angle of radiation. I wonder; if I put my house on the street and bought the houses on either side, re-possessed the school yard at the back; I wonder?

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BUILDING MODERN FILTERS

PART TWO

By "CABBAGE-TREE NED"

We are justified for our purposes in using the specialist's terms simply as a shorthand if they save wordiness later. So, having seen (Part One) that a synthesised filter is one designed as a whole, let us further agree that:

- Maximally-flat** (or Butterworth) means constant level of response over most of the pass-band, falling smoothly through the 3 dB point of nominal cut-off.
- Equal-Ripple** (or Chebyshev) means a filter permitting some ripples in the pass-band for the sake of getting much greater skirt-steepness.
- Complete-Ripple** (or Elliptic) is an equal-ripple filter with an optional extra in the form of very useful peaks of attenuation in the stop-band.
- Order of Filter** is the number of sections (each of which may be a parallel-pair or a series-pair) as occurs in the Butterworth bandpass.

SPECIFICATIONS— STATING WHAT YOU WANT

The filters we aim at are sufficiently described if any three of the following four quantities are stated:

- Ratio $f_s \div f_{co}$, which defines the skirt steepness (f_s is the frequency at which the desired number of dB attenuation is first reached).
- Order of Filter, N : i.e. number of elements or sections.
- Maximum Allowable Ripple in the pass-band: Δ_{MAX} .
- Minimum Attenuation needed in the stop-band: Δ_{MIN} .

NORMALISING

This is simply a process of scaling both impedance and frequency to more convenient values, so that one set of tables or graphs will serve to find the L and C values for any filter of a given type.

The normalised element-value in the tables is to be thought of simply as a reference-value.

For instance, the only difference between a 1 kHz. filter and a 10 kHz. filter is that all L and C values are 10 times as large in the 1 kHz. model as the 10 kHz. model. Similarly, on the impedance score, the element values in a 100-ohm filter differ from those in a 300-ohm filter only by a numerical factor, 3 in this example.

Most conveniently the tables normalise element values as if the filter were working into a 1-ohm load, with a cut-off frequency of one cycle/sec. (Hz.).

Then, to obtain the real circuit values we "de-normalise". That is, we must:

- Divide all L and C by the actual frequency;
- Multiply all R and L values by the actual impedance;
- Divide all C values by the actual impedance.

In symbols:

$$L_{ACTUAL} = L_{\tau} \frac{\text{Actual Impedance}}{\text{Actual Frequency}}$$

$$= L_{\tau} \frac{Z}{f}$$

$$C_{ACTUAL} = \frac{C_{\tau}}{f Z}$$

where the subscript τ means normalised or table values.

IMPEDANCE MATCHING

All lossless filter circuits can be designed to work for any chosen ratio of output impedance to input impedance, but different ratios imply different element values.

Hence to be realistic as to size of table, we must severely limit our choice to suit only the most common needs. Thus our tables will provide only for two types of filter impedance:

- Voltage Source:** Implying low source impedance and hence a "stiff" voltage that changes negligibly as load alters. Here the tables are for R_s (source) = 0, and R_{load} = 1.
- Power Source:** Maximum power transfer is required. Hence R_s = 1 ohm = R_L in the tables.

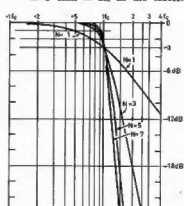


Fig. 1.—Frequency Response (attenuation v. frequency) of Butterworth Low-Pass Filters.

f_c = Cut-off Frequency.

N = Number of Elements.

If the response must be flat within, say, 1 dB, to a given frequency, f_c will have to be considerably higher, e.g. if a 3 element filter is to be not more than 1 dB down at 15 kHz., the curves show that 15 kHz. must occur at 0.8 of f_c , so we make f_c = 19 kHz.

VITAL PRECAUTIONS

The user must observe the following two rules if he is to reap the reward of predicted performance:

- A filter will only operate properly when driven from its proper source, and into its designed load. Failure to do this almost invariably worsens the performance.
- Do not use ordinary commercial r.f. chokes. Wind the coils in self-shielding pot-cores, and use polystyrene, mica, or polycarbonate capacitors, or back-to-back tantalums for the large C values often required at very low audio frequencies (few hundred Hz.).

MAXIMALLY-FLAT FILTERS

(Fig. 1)

Low-Pass and High-Pass

The rate of change of attenuation of the sloping skirts of the response is 6N dB/octave, where an octave means a doubling of frequency, and N is the order of the filter (or number of elements).

Thus the flat filter of the last article had five elements, as it was needed that the skirt should slope or fall 30 dB. within 1 octave of the cut-off frequency of 3.5 kHz. That is, frequencies beyond 7 kHz. should be down in magnitude by a factor of 1,000 in power.

Band-Pass

The important notions are:

Bandwidth = $B-W$ = $f_H - f_L$ = high freq. cut-off — low freq. cut-off.

Centre frequency = f_{co} is the geometric mean of the upper and lower 3 dB. or cut-off frequencies.

It appears further on as: $f_{co} = f_H f_L$.

The B-P filter is commonly composed of:

- Series-connected L and C in the series arm;
- Paralleled L and C in the shunt arm.

If these pairs of elements are chosen to be resonant in the pass-band, the series-arms will be low impedance and often no opposition to the transmission of signal, while the shunt arms will be high impedance and prevent leakage of the signal through a path parallel to the load.

On either side of the pass-band, of course, both series and shunt arms will prevent signal from reaching the load—as desired in a B-P filter.

PERSPECTIVE

The writer freely admits, by the way, that the simplest—where it will do the job—is the best. The double-tuned transformer adjusted for critical coupling is the simplest of all approximations to maximal flatness. Hence its

*VK3ZKQ, A. G. Birch, 5 Harrison Street, Bendigo, Vic., 3550.

use in commercial apparatus unless more exacting requirements demand a more costly filter.

Example 1

Consider a typical set of filters to provide band separation at audio frequencies in a cross-over network:

Specifications:

3 dB cut-off frequencies—
LP 500 Hz.
HP 1500 Hz.
B-P: $f_c = 500$ Hz.
 $f_H = 1500$ Hz.

Skirt steepness: Response is to fall off by 18 dB. within 1 octave of cut-off.

Impedance: Filter is to work from a voltage source into an 8-ohm load.

Solution: Since 18 dB. must equal 6N dB, we must have $N = 18 \div 6 = 3$ sections.

Low-Pass Section

Since the signal source is a voltage type, enter Table 2, voltage-source filters, at $N = 3$, and read off the normalized values of L and C.

As directed earlier, de-normalize these figures to obtain the real circuit values:

$$\begin{aligned} L_1 &= \frac{0.238 \times 8}{500} \\ &= 1.272 \text{ mH.} \\ &= 1.27 \text{ mH. (approx.)} \\ L_2 &= \frac{0.0795 \times 8}{500} \\ &= 3.808 \text{ mH.} \\ &= 3.81 \text{ mH. (approx.)} \\ C &= \frac{0.212}{500 \times 8} \\ &= 53 \text{ } \mu\text{F.} \end{aligned}$$

Transforming the Low-Pass to a High-Pass or Band-Pass Model

This may seem like gambling that a ghost will turn out to have substance. Nevertheless, it can be shown quite rigorously that the pictorial summary given in Table 1 presents a valid set of instructions.

Following the Table, we shall transform the LP filter of the last paragraph into a HP section, and a band-pass section in that order.

TABLE 1—TRANSFORMATION RELATIONSHIPS

FILTER TYPE	SERIAL ARM	SHUNT ARM	COMPLETE FILTER AND EQUATIONS
LOW PASS			$L_1 = \frac{Z_0}{f_c}$ $C_1 = \frac{1}{Z_0 f_c}$
HIGH PASS			$C_1 = \frac{1}{Z_0 f_c}$ $L_1 = \frac{Z_0}{f_c}$
BAND PASS			$L_1 = \frac{Z_0}{f_c}$ $C_1 = \frac{1}{Z_0 f_c}$ $L_2 = \frac{Z_0}{f_c}$ $C_2 = \frac{1}{Z_0 f_c}$

NOTE: All values are approximate (10%) with 1% error.

High-Pass Section: Find, in Table 1, the two simple instructions for transforming the normalized low-pass L-value into a high-pass C-value, and similarly the low-pass C-value into a high-pass L-value. The f_c -value appearing in these two instructions must, of course, be the proper HP cut-off

frequency, here 1500 Hz. The L and C values so obtained must be finally scaled by the impedance factor as shown in the tabulated calculations of Table 1A for our filter.

The resultant cross-over network is shown in Fig. 2.

(Continued on Page 19)

Normalized L-P Values	H-P Values for 1 Ohm	Real-Circuit Values for H-P
$L_{n1} = 0.238$ H.	$\frac{1}{0.238 \times 1500 \times 40} = \frac{1}{10^4}$	Divide by Z = 8 (because we are finding a capacitance). Obtain C1 = 8.3 μ F.
$L_{n2} = 0.0795$	$\frac{1}{0.0795 \times 1500 \times 40} = \frac{1}{10^4}$	Scale for Z = 8. Obtain C2 = 26.2 μ F.
$C_r = 0.212$	$\frac{1}{0.212 \times 1500 \times 40} = \frac{1}{10^4}$	Multiply by Z = 8, since we are finding an inductance value. Obtain L = 0.628 mH.

Table 1A.

Band-Pass Section:			(Multiply L's by 8) (Divide C's by 8)
$L_{n1} = \frac{0.238}{1000}$	$= 0.238$ mH.		1.9 mH.
$C_{n1} = \frac{1000}{40 \times 750,000 \times 0.238}$	$= \frac{1}{7.14 \times 1000}$		17.5 μ F.
$L_{n2} = \frac{0.0795}{1000}$	$= 0.0795$ mH.		0.636 mH.
$C_{n2} = \frac{1000}{40 \times 750,000 \times 0.0795}$	$= 420$ μ F.		52.5 μ F.
$L_r = \frac{1000}{40 \times 750,000 \times 0.212}$	$= 0.157$ mH.		1.26 mH.
$C_r = \frac{0.212}{1000}$	$= 212$ μ F.		26.5 μ F.

Table 1B.

Filter Order N	Element Values	L1	C1	L2	C2	L3	C3	L4
3		0.238	0.212	0.0795				
5		0.246	0.269	0.220	0.142	0.049		
7		0.248	0.268	0.263	0.222	0.168	0.104	0.0357

Table 2.—Voltage Source

Filter Order N	Element Values	L1	C1	L2	C2	L3	C3	L4
3		0.159	0.318	0.159				
5		0.0983	0.258	0.318	0.258	0.0983		
7		0.0708	0.199	0.286	0.318	0.286	0.199	0.0708

Table 3.—Matched Filters ($R_s = 1$ ohm — R_L)

Commercial Kinks

With Ron Fisher,* VK3OM

THE FT200, Part 4

It seems that FT200 mods show up for ever, at least I rather hope they will. Two letters just to hand are from Phil VK5NN and Kerry VK5SU, both of whom report on modifications and adjustments they have made. First off, over to Phil.

"Further to the valuable material already published, there are several matters which appear to require attention and for which solutions are not yet available. Everybody wants information, but it seems most are quite happy to wait for Yasu to come out with new mods for all to copy. I am numbered with the many as time is at a premium, but here are a few tips on the adjustment of the FT200 which may overcome common defects:

Balancing of Product Detector Injection

"After replacement of L106 in the cathode of the product detector V102 by a 10K resistor, the set sometimes lacks sensitivity, and even on some unmodified sets there are complaints of this; also the fact that the S meter gives different readings on the various bands. It has been found necessary to re-balance the b.f.o. injection by adjusting C165. This, of course, is difficult as this component is only a few pF, of twisted wire between pins 2 and 8 of V102 (12AX7). This may be done by putting in two pieces of wire 1" longer than the original ones, but as the adjustment is best done by reducing capacitance, a 1-4 pF. trimmer is preferred. A small 'Polar' concentric capacitor was used with 40% of the plunger screw removed.

"To adjust correctly, first remove the antenna co-ax plug and switch to 21 or 28 MHz. Screw in C165 until there is an increase in the S meter reading due to an excess of b.f.o. signal on the a.g.c. tube. Now slowly reduce C165 to the point where the S meter is just back to zero. You can hear the receiver sensitivity come up to maximum. The calibrator may be used as a strong signal source on 3.6 MHz. and a weak signal source on 28 MHz. This adjustment is recommended to those who have complaints about the FT200 S meter

Setting the BFO/Carrier Oscillator Frequencies

"Most FT200s and FT101s give very good clean signals when seen on a spectrum analyser, but there are some that sound rather low pitched and the speech is therefore indistinct. The manual simply says that the carrier crystals should be adjusted for best speech quality, but gives no instruction as to how this is best done.

"The filters employed in these transceivers are not always symmetrical, but are good enough to produce good crisp speech on all bands with either upper

or lower sideband. The filter has three peaks, the outer two about 1.8 or 1.9 kHz. apart and the third somewhere in between. There may be 6 to 8 dB. of difference between them, but this appears to be of little consequence.

"Setting the carrier crystals can be done by means of a plastic knitting needle sharpened as a screw driver to go between the slots in the top cover for adjusting the trimmers adjacent to the carrier crystals. Remove the antenna plug, zero the S meter and use the calibrator crystal as a signal for alignment on the 3.6 MHz. band. Tuning through the signal the peaks should appear at about 600-700 Hz. for the lower one and 2400 Hz. for the upper one. Adjust the r.f. tuning for a 20 dB. over S9 indication on the S meter, then tune down in best frequency until zero beat gives a pulsation on the meter between S3 and S5, dropping to zero as the beat note rises in pitch when the signal slides further down the skirt of the pass-band.

"Repeat with the sideband switch in the reverse position, adjusting the input signal lower peak to 20 over S9 again if the peaks are not symmetrical as usually they are not. Re-adjust the carrier frequency trimmers until you achieve a result something like the above for both the normal and reverse sidebands. The zero beats should then be about 3 kHz. apart on the main dial.

"Similar tests may be done with many other makes of equipment with worthwhile results. This test costs nothing and requires no test equipment. If you have either an audio signal generator, piano, or even a guitar, you can check where the peak frequencies lie. The lower peak is about D sharp or E above middle C, and the upper peak two octaves higher.

"This series of adjustments will change the sound of a transmission from what could best be described as muffled, to one which can be said to have 'presence' even with only 2.7 kHz. of band width."

Over now to Kerry VK5SU who has worked out a few very simple but interesting modifications.

Peak-Reading Type of Meter

The action of the meter can be slowed down and made into a peak-reading type by connecting a 100 pF. electrolytic condenser across the meter terminals. As the voltage across the meter is very low, a ten-volt working type would be quite large enough.

Kerry reports that the a.l.c. indication is now slowed down and easier to read.

Sensitivity on 28 MHz.

Sensitivity is a problem on the 28 MHz. band. Kerry makes the suggestion that amongst other things the oscillator injection at the 6U8 is insufficient, and that perhaps a buffer amp. after the heterodyne oscillator could be tried. However, one way round the problem is to substitute a 6GM6 for the 6BZ6 r.f. amplifier stage. The 6GM6 has a g.m. of 13,000, quite a bit up on the 6BZ6. The following

changes need to be made to the circuitry round the r.f. stage.

(a) A resistor of about 68 ohms across the 6CB6 filament which is wired in series with the new 6GM6, to balance heater voltages.

(b) Replace the existing 100 ohm cathode resistor R25 with one of 56 ohms.

(c) Replace R32 1K ohm decoupling resistor with one of 1.5K ohms in order to bring the h.t. down to 125 volts for the 6GM6.

(d) Wire a 3.9K ohm resistor in parallel with R24, the 15K ohm screen divider, to increase to 125 volts the voltage on the 6GM6 screen.

Finally, Kerry passes on a hint to improve the insulation of the e.h.t. wiring. After an h.t. short one night, Kerry traced the fault to the bolt holding the r.f. choke in the final compartment. The bolt was just long enough to cause an arc to the lug anchoring one end of the r.f. choke winding. Cure: Put a spacer washer under the choke.

Kerry is also the proud owner of an FT-DX401 and with a bit of luck might be tempted to come up with a few ideas on this set in the near future.

I seem to run out of space each month, just when I really get going. In other words, the Trio modifications will have to wait until next month. To all those who have written to me for carphone circuits, I am getting these out as fast as I can, however sometimes there is an unavoidable delay of a week or two before I can arrange copying of them.

DOW-KEY CO-AXIAL RELAYS SERIES "60" S.P.D.T.



Features. The 60-2228 is a remote operation, ruggedly constructed S.P.D.T. co-axial relay designed for operation on low-level to 1 kw. For transmitter-receiver applications, it is fitted with a spec. high isolat on 'G' connector in the receive position. This 'G' connector increases the isolation to greater than 100 dB at frequencies up to 500 MHz when the receiver is switched to earth whilst transmitting.

Model 60-2228 employs UHF connectors, but other types of connectors are also available.

Specifications. Model, 60-2228, coil voltage, 24V DC (18-31V); power rating 1 kw., impedance 50 ohms, operating time, 25 ms., VSWR less than 1.5 at 500 MHz.

Price, ex stock, \$27.00 (plus S.T. \$4.05)

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NEW TRANSCEIVER FROM YAESU!

MODEL FT-75

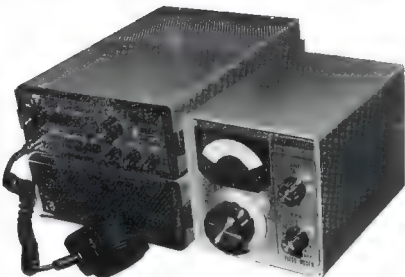


Compact,

Solid State,

80-10 mx,

SSB and CW



This small size Transceiver, with a choice of FP-75 AC Power Supply or DC-75 DC-DC Converter, enables home station or mobile installation in a minimum of space. All solid state except transmitter driver 12B7 and PA 12CD6 valves. RF output, 30 watts max. Tappings on the power transformer HT secondary enable transceiver power to be reduced if required. The transceiver is crystal controlled, with VFO to pull crystal frequency a few kHz., from approx. 3 kHz. on 80 mx to 15 kHz. on 10 mx. Optional VFO, type FV-50C, available for full coverage home station use.

Pre-tuned driver and PA circuits reduce controls to a minimum: just switch on, press the mic. button and talk! Simple and safe mobile operation. Noise blanker and squelch incorporated.

Makes an ideal exciter for VHF transverter.

Three crystal channel capability for each band, with three push button channel selector switches, plus one for VFO selection. One crystal is provided for each band except 20 mx. Extra crystals available. Sidebands are automatically selected: LSB 80 and 40 mx, USB 20, 15 and 10 mx.

Front panel Bandswitch, eight push buttons for crystal selection, ext. VFO, and power control switching. VFO control, meter, mic. socket, noise blanker, squelch, AF gain, and RF gain.

Rear panel: Antenna, power, and VFO sockets, meter switch.

Meter function as 5 meter on receive, PA cathode current or relative RF output on transmit. Panel lights indicate channel or switch in use.

Separate heater switch enables reduction of current drain on battery operation, when receiving only.

Transceiver includes a PTI mic., antenna plug, key plug, and four crystals for 3555, 7065, 21400 and 28550 kHz. A total of 15 crystals may be installed three for each band.

See review article, September 1972 "Amateur Radio".

SPECIFICATIONS

Transmitter power input, 80 watts max.

Transmitting modes, SSB and CW.

Antenna impedance, 50 ohms unbalanced.

Carrier suppression, better than 40 dB.

Sideband suppression, better than 40 dB, at 1 kHz.

Transmitter audio bandwidth, 400-2700 kHz., plus or minus 3 dB.

Crystal filter, 5173.9 kHz.

Receiver sensitivity, better than 0.5 uV. for 10 dB S/N.

Image ratio, better than 50 dB.

Selectivity, 2.3 kHz. at -6 dB., 4.5 kHz. at -80 dB.

Audio output impedance, 4 ohms

Audio output power, 1.8 watts at 10% dist.

Operating voltages: FP-75 (AC PS), 117v or 234v AC 50-60 Hz.

DC-75 (DC PS), 13.5v DC neg. earth.

Current drain on DC,

Receive (heaters off), 0.3 amp.

Receive (heaters on), 1.4 amp. Transmit peak, approx. 6 amp

Valves & semiconductors: 2 valves: 16 transistors, 5 FETs, 3 ICs, 83 diodes.

Dimensions

FT-75, W 210 mm. (8 1/4") x H 80 mm. (3") x D 300 mm. (12")

FP-75, W 210 mm. (8 1/4") x H 80 mm. (3") x D 300 mm. (12")

DC-75, W 210 mm. (8 1/4") x H 85 mm. (2 3/4") x D 170 mm. (6 3/4")

Weight

FT-75, 3.8 Kg (8 1/2 lb.), FP-75, 4.5 Kg (10 lb.), DC-75, 1.46 Kg (3 1/2 lb.)

Cabinet finish two tone gray, silver edging

Both power supplies have built-in speakers, with black Arlon cloth grill;

and power cables with high quality multi-contact plugs attached. DC-75

includes a mobile mount bracket.

PRICES: FT-75 \$289. FP-75 \$49.90. DC-75 \$49.90. FV-50C \$39.90.

All Prices Inc. S.T. 90-day warranty. Freight is extra. Prices and specs subject to change without prior notice.

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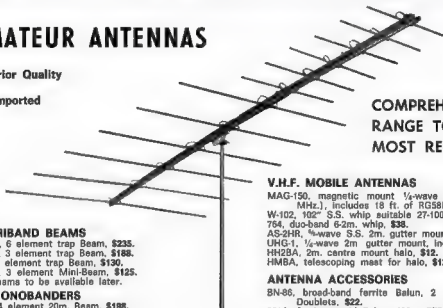
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TH3MK3, 3 element trap Beam, \$188.
TH3Jr, 3 element trap Beam, \$130.
B24-RK3, 3 element Mini-Beam, \$125.
Quad Beams to be available later.

H.F. MONOBANDERS

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203BA, 3 element 20m. Beam, \$178.
153BA, 3 element 15m. Beam, \$85.

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18AVT, 10m. thru 80m. trap Vertical, \$88.
12AVQ, 10m. thru 20m. trap Vertical, \$42.50.

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MC-40, 40m., \$24.50	MC-11, 11m., \$17.00
MC-20, 20m., \$21.50	MC-10, 10m., \$16.00

Helical:

HW-80, 80m., \$25.00	HW-15, 15m., \$20.00
HW-40, 40m., \$23.50	HW-11, 11m., \$20.00
HW-20, 20m., \$21.50	HW-10, 10m., \$20.00

Fittings:

BPR, bumper mount, \$15.
BDYF, heavy duty adjustable body mount, \$13.50.
HWM-1, fixed body mount, \$12.50.
MM-1, single hole light weight swivel body mount, \$8.
SPG, heavy duty spring, \$10.
SPGM, light duty miniature spring, \$6.50.
OD, quick disconnect accessory for mobile whips, \$6.
JMS, "Jiffy" body mount, \$9.

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28, 8 element 2m. Beam, \$29.50.
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GPG-2, 2m. 1/2 wave ground-plane, \$25.
GP-50, 25 thru 54 MHz. ground-plane, \$25.
AR-2, 2m. half-wave gamma loop matched vertical, \$25.
A144-7, 7 element 2m. Beam, \$21.
A144-11, 11 element 2m. Beam, \$29.50.
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Also available, 52 and 430 MHz. Beams.

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HMBA, telescoping mast for halo, \$12.50.

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BN-86, broad-band ferrite Balun, 2 kw., for Beams and Doublets, \$22.
351A, ferrite toroid Balun, 400w. PEP, 75U/300B, \$11.25.
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353B, ferrite toroid Balun, 400w. PEP, 75U/75B, \$9.50.
LA-1, Lightning Arrestor, for installation in standard 52 or 72 co-axial feedline, designed to Mil. specs, \$29.90.
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SWR-2, SWR Bridge, 50 ohm, dual meter type, \$20.
ME-11-K, SWR Bridge, 50 ohm, dual meter, large size with calibrated power meter, \$29.
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Digital Electric Clocks, 24-hr., AC and battery operated.
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EK-26, Katsumi Electronic Keyer, \$59.50.
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Add \$1.00 P.P. on small items, clocks, switches, etc. Larger items, nets, antennas, etc., are despatched air freight interstate, rail intrastate. Write us for quote.

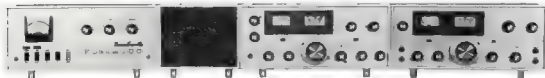
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160-10 mx. WWV, C.B.

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80-10 mx. peak in. 300w.

FTDX-401 TRANSCEIVER: 80/10 mx. PA two x 6KD6, 560w. peak input SSB, choice of manual, PTT or VOX operation. Full coverage on 10 mx, offset tuning, calibrator. Includes fan, CW filter, noise blander, \$675.

FV-401 EXTERNAL VFO: For FTDX-401, \$115.

FT-101 TRANSCEIVER: 160/10 mx. SSB, AM, CW, PA two x 6JS6A, 300w. peak input SSB. Built-in dual AC/DC power supply. Low current drain transistorised except for transmitter driver and PA. Plug-in modules, I.F. noise blander, FET receiver RF, clarifier, built-in speaker. Ideal for portable/mobile from 12v. DC, or in the shack on AC, \$720.

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FP-200: Yaesu AC Power Supply for FT-200, in matching cabinet with in-built speaker, \$90.

DC-200: Yaesu 12v. DC Power Supply for FT-200, complete with special plug and cable, \$138.

FT-75 TRANSCEIVER: SSB and CW. VXO, noise blander, squelch. Very small size, transistorised, a superb little rig [see review "A.R." Sept. '72]. Microphone and four crystals included, \$289.

FP-75 AC POWER SUPPLY: 230v., for FT-75. Built-in speaker, power cable and plug, \$49.90.

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FLDX-400 TRANSMITTER: 80/10 mx. PA two x 6JS6A, 300w. peak input SSB. Manual, PTT or VOX control, SSB, AM, CW. Adaptable to FSK for RTTY. Mechanical filter, \$435.

FRDX-400 RECEIVER: 160/10 mx. Mechanical filter, I.F. "Y" notch rejection tuning, calibrator. Provision for installation of FET VHF converters, FM, and 600 Hz. mechanical filter for CW. Can be coupled with the FLDX-400 for transceiving, \$425.

FL-2000B LINEAR AMPLIFIER: 80-10 mx. Tubes, two x 572B triodes in G.G., twin fan cooled, \$398.

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Sets pre-sales checked, after-sales service, spares availability, and warranty.

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NEWCOMER'S NOTEBOOK

With Rodney Champness,* VK3UG

LEARNING MORSE CODE

Part 1. Receiving

Many people have trouble learning Morse Code, and I freely admit I did too. I have heard some say that they cannot learn Morse Code, that it is useless and if a full Amateur licence were obtained they would not use Morse anyway.

To those who do claim that it is impossible for them to learn Morse to 10 w.p.m., all I can say is that if you brain-wash yourself in this anti-way, I cannot help you. If, though, you are prepared to assert yourself to the learning of Morse with an unbiased attitude, you will pass the Amateur licence with little trouble. Like anything worthwhile, such as studying for the theory part of the exam., it takes time to become proficient. After all, the certificate we sit for is called a Certificate of Proficiency.

What is the value of Morse in this day and age where teleprinters and other exotic modes of communications are in the thing, and Morse is old hat, "obsolete"? The points I see for Morse Code are as follows:

- (1) A sense of achievement; after all it is a thrill to pass after the 20th try at a Morse exam.
- (2) It is the most effective DX mode that is easily used, and the most effective for the Oscar Satellite.
- (3) The equipment is simple, but effective.
- (4) The satisfaction of a quiet QSO without every yahoo eaves-dropping.

There is one reason why I didn't use Morse after obtaining my full call. **Fright.** Yes, that is right, being plain scared of it and of how any seasoned operator would treat me if I dared call. Don't worry, I've used QRS many times, the best operators don't mind at all. It's a long story, I do use Morse on occasions now—I am not the fastest or slowest, but I do try to make my sending of as high a quality as I can. I use an ordinary hand key as well as an electronic keyer.

The first part of this article has been to show you why I think Morse is worthwhile and to the limited extent the troubles I had learning to the standard required for a pass. Now the hard facts on how long you can expect to take to become proficient in the speed range 10 to 14 w.p.m. It pays to be a bit better than the exam speed to allow for exam. jitters. If you are prepared to do half an hour of receiving practice at least four days per week, the A.O.C.P. should be within your grasp in about six months.

How do you learn to receive Morse Code? You undoubtedly have heard Morse on your own or someone else's short wave receiver. Speech is a sound method of communication and so is Morse. Each is picked up and automatically analysed by your brain and transformed into intelligence—it is hoped. This means that Morse, like English, is a sound language and therefore should be learnt as such. For instance, the letter "v" is "d'd'dah" not "dot dot dot dah", the letter "p" is "d'dah dah dit" not "dot dash dash dot", and "E" is "dit". From this it will be observed that when a dot is at the end of a character it is pronounced as "dit", but wherever it is followed by some other element it is pronounced as "d".

You should learn each letter in a rhythmical singing way. Everyone around your household will think you've finally gone round the bend. Who cares, you want to learn the Morse so let them think what they like.

Having learnt each letter of the alphabet, the numerals and a few punctuation marks, etc., in all about 40 to 45 characters, you will be ready to start taking slow Morse. This may be from tape recordings, disc recordings, a friend's sending, or reception of the air. Before doing this, get some patient person to ask you letters, numerals, etc., at random. This will help you get away from the parrot fashion memorising of the alphabet. Having satisfied yourself on this point, now is the time to get down to serious practice to get your speed up.

It then becomes necessary to receive Morse Code at about 5 w.p.m. You should read this with difficulty. Where do you get this practice? The N.S.W. Division of the W.I.A. run Morse on VK2BW1 nightly on a frequency of 3550 kHz. nominally from 7.30 p.m. local time with speeds from 5 to 18 w.p.m. This is good copy in the winter months at least for the Eastern States. Copy may be difficult in summer due to static, etc.

ZKY, the Royal New Zealand Air Force station, on frequencies of 3236 and particularly 6885 kHz., should be good copy at times. Eastern States Summer Time, the transmissions start 8 a.m. for 14 hours, and 5.15 p.m. for 8 hours. Reports on this transmission would be appreciated by the Air Force. They transmit m.c.w. with a power of 300 watts.

Tapes are available from various Amateurs and I suggest you consult the Divisional Directory on page 3 of March 1972 "Amateur Radio" for further details.

I have been informed that the Youth Radio Club Scheme also have tapes available. I would suggest that you contact your State Supervisor for details. Their call signs are shown in the Directory mentioned above. For Morse records I would suggest a re-

cently advertised course. A review of those available may appear in "A.R." soon I believe.

That's about all on the receiving side. Part 2, "Sending", will appear soon. In the meantime don't try sending; concentrate on receiving; **don't** buy one of those "beginner's" Morse keys. The ones I have seen are unsuitable for beginner and old-hand alike. More of this in the second part.

Following on the first article on converting old radios, how does the thought affect you of converting an old mains radio into a low power 160 metre or 80 metre transmitter, using very few parts other than those already in the set?

As mentioned last month, I have just shifted location and my workshop is not yet in being, so for the moment I must concentrate on the theory side of "Newcomer's Notebook". There are a number of simple accessories coming up for use in converted domestic radios, and this will be the follow up on the conversion of these sets, recently described.

ANTENNA PARTS, KITS



QUAD HUB: \$17.25 + p/p. \$1

QUAD KIT

consisting of Hub, Spreaders, 350 ft. 18 a.w.g. wire, Nylon line, insulators and Araldite. With Bamboo Spreaders, \$44.00; with composite Aluminium tube/10 ft. solid fibre-glass spreaders, \$82.00.

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6 ft. x 1/2" butt, 1/4" tip, solid F/G. \$3.00.

8 ft. x 9/16" butt, 1/4" tip, solid F/G. \$4.50.

Brass tip chunk, 50c.

Brass bottom fitting, specify 3/8" UNF (SAE) or 1/2" Whit thd., \$1.00.

Long items must be sent freight fwd. on road or rail. Copies of March 1970 "A.R." article available by sending SAE.

S. T. CLARK

P.O. BOX 45, ROSANNA,
VIC., 3084. Ph. 45-3002

FEDERAL W.I.A. NEW ADDRESS:

P.O. BOX 150,
TOORAK, VIC., 3142

Victorian Division address is unchanged as
P.O. Box 36, East Melbourne, Vic., 3002.

* 44 Rathmullen Road, Boronia, Vic., 3155.

"20 YEARS AGO"

With Ron Fisher, VK3OM

Two excellent technical articles were featured in the December 1952 issue of *Amateur Radio*. A Phase Type Single Sideband Suppressed Carrier Exciter by N. Southwell, VK2ZF, probably represented the ultimate in technical thinking of the time. In 1952 only a handful of Amateurs were using a.s.b., and probably most of the others thought it a passing fad, after all, how could you improve on a circuit basically consisting of a pair of 6SN7s as balanced modulators driving a 6BA6, with an 807 in the final. Full details of the design of the phase shift network were included.

Hans Albrecht, VK3AKH, described his simple v.l.o. with temperature compensation. A good deal of design data was included on the calculation of bandspread tuning and on the selection of the correct degree of temperature compensation. A very complete article containing information that could be hard come by even these days.

A front cover advertisement announced the arrival of the Innovat series of valves. Developed in Australia by Philips, the following types were included. 6V4, 6AS, 6AN7, 6NL, 6BD7, 6BH5 and 6AD5.

The Editorial page looked back over the preceding twelve months and opened with the following paragraph: "Over the past twelve months it is gratifying to note that in the realm of Amateur Radio events have taken place not only indicating the true Amateur spirit and enthusiasm for his hobby, but also his willingness and ability to organize and function emergency communications in time of need." Quite a tribute.

Federal Executive Proceedings reported on the following Request for Divisional status by VK3 Amateurs. Various suggestions for Civil Defence, disposition of unclaimed QSL cards, 1958 Olympic Games suggestions; Federal Policy Book; combining of Federal and Uniform Divisional Constitutions, and finally standard log sheet.

The best DX bands for the month were 7 and 14 MHz. The DX page edited that month by VK3RIF for the first time, showed that 31 MHz was still improving with European peaks at 1500 to 1100z. The 10 metre band was still at a very low ebb, with the only report of activity coming from VK3KJ.

Y.R.C.S.

With Bob Gutherlet*

Following the request made by the Conference of State Supervisors, the appointment of Rex Black, VK2YA, as convener of a Standards and Syllabus Committee, is confirmed. The matter of "Novice Licence" may influence certain trends in our syllabus. In the meantime, we can be confident that Rex and his committee will appraise the general situation to the point that in due time we may achieve standardisation.

After months of preparation, correspondence, etc., there appears to be a strange silence regarding the fate of "Novice Licensing". The introduction of such a licence would be a real shot in the arm for Y.R.C.S. It would give a boost to the electronics industry in Australia, and it has done in the United States. Perhaps some crystal gazing prophet will break the silence and make a forecast. Who knows?

Allen Dunn, S.A.S. Supervisor, has conveyed the news that Bert Grove of the Elizabeth Radio Club has accepted the position of Editor for "Zero Beat". Thanks, Bert.

Quest for Projects. Many of our clubs have instructional and interesting bits of equipment. It would be helpful to many instructors if we could pool such ideas. If clubs will send me copies of circuit and construction details, I will undertake compiling a brochure for distribution to all States.

* Federal Y.R.C.S. Co-ordinator, Methodist Mause, Kadina, S.A., 5264.

NEW CALL SIGNS

AUGUST 1972

- VK1ZHL—R. F. Lavery, 85 James St., Curtin,
VK1ZKB—R. F. Blythe, 21 Glasgow Pl., Hughes,
3005.
VK2ZW—A. J. Perkins, 4 May St., Sawtell,
VK2ADR—D. W. Reed, 22 Rundle St., Ullah,
VK2BDW—W. Dunn, 53 Mississippi Ave.,
Seven Hills, 2147.
VK2DH—R. Baty, 95 Cooribah Heights Rd.,
Engadine, 2233.
VK2KXB—C. M. Walker, 18 Trigalana Pl.,
Frenchs Forest, 2222.
VK2ZDY—D. R. De Cann, 25 Blacket Dr.,
Castle Hill, 2154.
VK2ZXB—F. R. O'Hare, 505 Henry Lawson Dr.,
Picnic Point, 2213.
VK3BY—W. Williamson, 30 Lalona Ave.,
Knoxfield, 2189.
VK3JN—J. N. Blake, 7 Josephine St., Oak
Park, 3046.
VK3MY—M. A. Ribbett, 15 Yanigin Dr., Glen
Waverley, 2159.
VK3AKK—B. J. Kemp, 3 Cedar Crt., Glen
Waverley, 2150.
VK3JGN—R. W. Rogers, Station: 31 Thompson
Crt., Werribee, 3030; Postal: P.O. Box
29, Werribee, 3030.
VK3BCT—H. J. Brice, 94 Jasper Rd., Bentleigh,
2224.
VK3YOV—D. J. McManus, Barkers Creek, via
Castlemaine, 3525.
VK3VHA—L. MacDonald, Geelong Rd., Bun-
inyong, 3537.
VK3ZSE—K. G. Burlinson, 2a Park Cres., Falk-
land, 3072.
VK3ZST—K. M. Stephens, 6 Cameron Ave.,
Melby, 3070.
VK4OO—F. E. Grimth, 5/5 Laycock St., Surfers
Paradise, 4217.
VK4ZD—R. Catton, No. 4 Lodge Flats, Cr.
Burreas and Edmund St., Caloundra,
4601.
VK4ZAT—B. J. Keris, 25 Ryan St., Mackay,
4740.
VK4ZAV—R. F. Beek, 60 Koorung St., The
Gap, 4601.
VK4ZFC—T. D. Gregory, Danga, Welsa, 4874.
VK4KC—C. A. Hermiston, Station: O.T.C.,
Carnarvon, 5791; Postal: P.O. Box 799,
Carnarvon, 5791.
VK6HH—Hemilton Senior High School Area
Radio Club, Purvis St., Hamilton
6168.
VK6HZ—R. L. Hulsenga, 28 Kingsale St.,
Exmouth, 6707.
VK6WY—R. Wawzynski, U.S. Navconista Hott,
Exmouth, 6707.
VK8KS—K. C. Smith, Station: 2 Stasnowsky
St., Alawa, Darwin, 5794; Postal: P.O.
Box 2099, Darwin, 5794.
VK8PF—J. McWood, 25 Johannsten St., Alice
Springs, 8250.
VK8PL—L. Pedrin, Station: Mobile; Postal:
P.O. Box 23, Lee.

THE ROSS HULL VHF CONTEST IS NOW

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CONTESTS

With Peter Brown,* VK4PJ

JOHN MOYLE MEMORIAL NATIONAL FIELD DAY

Some comments on the rules published here. You will note that I have not gone ahead with the proposal to use repeaters. I received comment from members who may have stood most to gain and as they were not keen on the idea has been dropped.

V.h.f. operators please note the Section (e) which I trust will appeal to you. Please give it a good trial. The scoring rate has not been altered although mobiles may make more than one contact with the same mobile station with the usual 2-hour space. There should be some high scores in this section. "Drive carefully".

As part with the mobile section, rules are as last year with the one important exception—c.w. < w contacts count double. I am looking forward to some overseas interest and you might comment in your log.

Look out for the ZLs on 80 and 40 metres. It is their Field Day. I include some of Jack's (ZL3GX) comments: "... our National Field Day is primarily a means of simulated emergency practice ... for example, the use of emergency power ... is to be under temporary shelter ... use of only 50 and 40 ... and I know of many who go out and make the operation a picnic one." Whatever serial number you receive will be okay. If the ZLs can make it a picnic day, why not you???

Get some of your friends together and have a good day. Remember that certificates have been offered to the two overseas stations with the greatest number of Portable or Mobile Australian contacts. I wonder if we will get any mobile/mobile DX?

ROSS HULL MEMORIAL VHF-UHF CONTEST, 1972-75

I trust that the rules for the next contest were to your liking and that you have already checked your rig for the arduous time ahead. If it is not to be an arduous time, I am sure that those having such a time will be appreciating a call from you.

Crack the contest rules over under way now. If we go to round figures in metric, what do you suggest? Move up or move down; what range?

CONTEST DATES

First Hull: On Nov 1401 GMT 4th Dec. 1972, to 1400 hrs GMT, 21st January, 1973.

John Moyle National Field Day: 0600 GMT, 10th Feb. 1973, to 0800 GMT, 11th Feb. 1973. The second week-end in February.

Remembrance Day 1973: August, get that c.w. operational, not much time.

* Federal Contest Manager, Box 638, G.P.O., Brisbane, Qld., 4001.

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teur Radio applications

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N.S.W.: Hy-Q Electronics, 284 Victoria Avenue,
Cherrywood, Pty. Ltd. 419-2387.
QLD.: Dresser Aust. Pty. Inc., Brisbane.
Phone 75-1165
W.A.: R.F. Systems, Perth.
Phone 46-7173
General Equipments, Adelaide.
Phone 83-4844
S.A.B.: Vdeo and Sound Service Co., Hobart.
Phone 34-1182
M.T.: Combined Electronics,
Phone Derwin 6881.

John Moyle Memorial National Field Day Contest, 1973

The Wireless Institute of Australia invites Amateur and Short Wave Listeners to take part in this contest which is held in memory of a great supporter of the Institute, John Moyle. John passed away not long after returning to Australia after representing us at an International Conference.

This contest is either an individual effort or a group effort. There are two Divisions (parts) of this contest, one of 24 hours' continuous operation, and one of six hours' continuous operation, within the 36 hours available.

DATE AND TIME

From 0000 GMT, February 10, 1973, to 0000 GMT, February 11, 1973.

RULES

The operators of Portable or Mobile Stations within VK call areas will endeavour to combat other Portable or Mobile and Fixed Stations in VK, ZL and foreign call areas.

RULES

1. In each Division, 24-hour or 6-hour, the operating period must be continuous.

2. In each Division there are seven sections:

- (a) Portable, fixed field station, transmitting, phone.
- (b) Portable, fixed field station, transmitting, c.w.
- (c) Portable, fixed field station, transmitting, open.
- (d) Portable, fixed field station, transmitting, open, multiple operation.
- (e) Mobile, transmitting, phone.
- (f) Fixed transmitting stations.
- (g) Receiving of portable and mobile stations.

3. Contestants must operate within the terms of their licence.

4. A Portable, fixed field station must operate from a power supply which is not used to move a vehicle or which is not connected to a permanent installation.

5. A Mobile station must be installed in a vehicle.

6. No apparatus used by a field station may be set up on site earlier than 24 hours prior to the contest.

7. All Amateur bands may be used, but no cross-band operation is permitted.

8. Cross mode operation is permitted.

9. All operators of a multiple operator station must be located within a half-mile diameter circle.

10. For each transmitter of a multiple operator station a separate log shall be kept with serial numbers starting from 001 and increasing for each successive contact by one.

All logs of a Multiple Operator Station shall be submitted by the operator under whose call sign the transmitters are working.

No two transmitters of a Multiple Operator Station are permitted to operate on the same band at one time.

11. Amateurs may enter for any section.

12. An Amateur may enter for both Mobile and Portable sections but a separate log must be forwarded for each section which must be for one continuous period in each case, i.e. operators must not keep alternating between mobile and portable.

13. Entrants must call "Mobile" or "Portable" as the case may be, e.g. "VK3XX Mobile" if a fixed field station.

14. Mobile stations and portable stations can contact each other as well as contacting fixed transmitting stations.

15. The usual method of giving RS or RST reports followed by serial numbers starting with 001 shall be adopted.

Scoring.

A: For Portable or Mobile Stations—

Portable or Mobile Stations outside entrant's call area 15 pts.

Portable or Mobile Stations within entrant's call area 10 pts.

Fixed Stations outside the entrant's call area 5 pts.

Fixed stations within the entrant's call area 2 pts.

B: For Fixed Stations—

Portable or Mobile Stations outside entrant's call area 15 pts.

Portable or Mobile Stations within the entrant's call area 10 pts.

17. Mobile operators may contact the same mobile station repeatedly provided that two full hours elapses after the previous contact.

18. Operation via active repeaters or transmitters is not allowed for scoring purposes.

19. All logs shall be set out under headings of Date/Time in GMT, Band, Emission, Call Sign, RST Sent, RST Received, Points Claimed. List contacts in numerical order.

A quarto front sheet to show the following information:

Name Division
Address Section

Call Sign
Call Signs of other operators

Location Points
Operating times, from to

I hereby certify that I have operated in accordance with the rules and spirit of the contest.

Details of equipment.

20. Certificates will be awarded to the highest scorer of each section of the 5-hour and the 24-hour Divisions provided there is a minimum of three logs submitted in that section. The 8-hour certificate cannot be won by a 24-hour entrant.

21. Entries must be forwarded in time to be opened on 23rd March, 1973. Mark your envelope to indicate that it is a John Moyle Memorial National Field Day entry and address to Federal Contest Manager, C.I.A., Box 558, G.P.O., Brisbane, Qld., 4001.

22. All c.w./c.w. contact count double. Refer sections (b), (c), (d).

Written comments will be received with interest. The decision of the Federal Contest Manager is final and no disputes will be entered into.

RECEIVING SECTION

This section is open to all Short Wave Listeners in VK call areas. The rules shall be the same as for the transmitting stations but may omit the serial numbers received.

Logs must show the call sign of the Portable or Mobile Station heard, the serial number sent by it and the call sign of the station being contacted.

Scoring will be on the same basis as for transmitting stations. It will not be sufficient to log a station calling CQ. For scoring purposes the left hand column of the log example must show only Portable or Mobile stations.

A certificate will be awarded to the highest scorer of each of the 5-hour and 24-hour Divisions, both individual and club entries.

EXAMPLE OF VICTORIAN EWL LOG

Date/Time	Call Sign	RST	Station	Pts.
GMT Band	Heard	Sent	Contacted	Claim
0650 80	VK3AA/P	5901	VK3ATL/P	18
0805 20	VK3AT	49015	VK3QV	10
0640 20	VK3WW	59010	VK3QV/P	*
0650 2	VK4ZZA/M	59007	VK4ZZA/M	10

* No score (fixed station).

WIN A FT101 FOR XMAS OR A HOLIDAY TRIP TO U.K.

These and many other prizes are offered in the W.A. Division's first BIG RAFFLE. Below is a list of prizes that you could win if you buy a ticket.

1st Prize: YAESU FT101 TRANSCEIVER or Qantas Excursion to London (1954)
or 14 Days' Holiday, Motel accommodation by Ansett (1955)
or Any Holiday to winner's choice to 1956

2nd Prize: Five Years' Subscription to the W.A.
3rd: Portable Typewriter (1952).
4th: Five L.P. Records of choice (1952)
5th: Bedroom Rug (1953)
6th: Hamper of Groceries (1953).
7th: 50 Gallons of Petrol (1954).
8th: \$20 Bill.
9th: Christmas Turkey.
10th: Perfume (1955).

Send your Cheque, M.O. or P.N. for full book at \$4, half book at \$2, 5 tickets for \$1.

TO TREASURER, W.I.A., W.A. DIVISION,
BOX N1002, G.P.O.,
PERTH, W.A., 5001.

AWARDS COLUMN

With Geoff Wilson,* VK3AMK

Letters to the Editor

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

Let us share it with the up and coming. How? By blowing the dust off that old a.m. gear and using it occasionally, especially on short-haul contacts, where it works quite well and, secondly, by developing and using low power (transistorised a.m. equipment which can be built by the relatively unskilled incidentally, how many people build their own a.s.b. equipment?) at a cost of a few dollars and which is powered at sub-lethal voltages, for example, from a 12-volt car battery.

—G. Craggs, VK2ATG.

Writing about the VKS Interstate Contest held on 1st October, Rod Cunningham, VK5UV, said that good v.h.f. contacts were had from the mobile QTH on Bumbunga Hill (1,395 ft. a.s.l.) about 75 miles N.E. of Adelaide, both back into Adelaide and to country stations VK3RZ at Whyalla, VK3ZMJ at Port Pirie and the three lams (VKs NIZ, SZIN and SVJ) on Yorke Peninsula.

He and Peter VK3ZPS nearly froze overnight and made 25 contacts with the comment that activity this year seemed lower because of good weather and the car race.



Picture of station set up on the trig point on Bumbunga Hill by VK5UV and VK3ZPS.

OBITUARY

HUGH STITT, VK1WH

The late Hugh Stitt, VK1WH, widely known as Hugo, was the descendant of an old Scottish family which settled on the Lauchlin, near Forbes, about a century ago. Hugo was educated at the Kings School, Parramatta, and developed great keenness on wireless, being the first to receive T.V. over the mountains.

A man of charming personality with a wide circle of friends including some of the Forster-Tuncurry Golf Club where he had been chairman.

Deepest sympathy is extended to his wife Jean and to his sons and daughters. —John, David, Helen, Robert and Angus.

AMATEUR RADIO AND RADIO ASTRONOMY

To All VK Amateurs.

Recently, the National Australian Federation of Amateur Astronomical Societies (N.A.F.A.A.S.) was formed, with the object of federating and unifying the actions of the 90-odd amateur astronomical societies in Australia. One problem facing N.A.F.A.A.S. is that of quick communication. As a prospective amateur myself, Amateur Radio was considered. This letter is an attempt to get in contact with those amateur operators with an interest in astronomy, and associated sciences.

Here is a chance for you to increase your knowledge in astronomy and radio astronomy by assisting in the operation of Astranet, the Australian Astronomical Radio Network. As well as this, you will be helping and increasing the status and knowledge of amateur astronomers in Australia and helping a good cause. If you can help, please contact me at the address given below.

Yours faithfully,

S. Russell, Secretary, I.A.S.Y.S.
32 Garden Avenue,
Figtree, N.S.W. 2590.
Phone (042) 52-5279.

"WILL AMATEUR RADIO BE KILLED BY SINGLE SIDEBAND?"

Editor "A.R." Dear Sir,

Single sideband has more talk power than certain modulation and will punch through where the other cannot. It does not up heterodynes with other stations because the carrier is missing. It occupies less bandwidth because one sideband is missing.

This we all know and appreciate. But have we considered the cost? Not only the beautiful dollars for the transmitter and the beam, but also the cost in other directions. Consider the young short wave listener. He was (past tense) a lad whose sole equipment was the domestic radio with shortwave facility. This enabled him to listen to VK3AAA talking to VK3BBB. His interest was immediately kindled and he lost no time in making enquiries, and in many cases eventually became an Amateur himself. His modern counterpart has his own transistor radio but when he awakes, and wonders what does he hear on the Amateur bands but a lot of indecipherable duck talk? His interest is lost in about ten seconds, during which he decides the fault is not in his radio; there must be something wrong with that transmission, whatever it may be. The spark, never having been kindled in the first place, cannot become a flame and the lad's interest moves off in some other direction.

If the place left by Silent Keys[†] are not filled by young lads (and ladies) then sometime in the not very distant future the ranks of Amateur Radio are going to be considerably thinned. The question arises, "Will Amateur Radio be killed by single sideband?"

Our hobby is worth nurturing; it has something of interest to give to the community. We have derived a lot of pleasure from it so

W.I.A. D.X.C.C.

PHONE—

VK5MS	317/343	VK5AB	295/314
VK6RU	319/344	VK4UC	292/300
VK4KS	319/328	VK3APK	291/320
VK3AIO	308/326	VK4PE	285/336
VK6MK	304/307	VK4FJ	294/307
VK4VK	300/303	VK4TY	285/306

New Member

Cert No.	Call	Total
137	VK3GV	101/102

Amendments

VK3WV	146/161	VK2ALM	203/204
VK3DO	121/118	VK4RF	237/238
VK3ZF	182/183	VK3AMK	241/242

C.W.—

VK3AHQ	307/326	VK3NC	272/297
VK2QL	303/323	VK3RU	294/299
VK3YL	289/287	VK3YD	282/281
VK3APK	287/286	VK4TY	287/272
VK4PF	287/215	VK4VY	234/235
VK3KS	286/200	VK3TL	232/230

New Member

Cert No.	Call	Total
100	VK3GR	104/105

Amendments

VK3LV	125/128	VK4RF	212/226
VK3DO	194/110	VK4KX	216/217
VK3VF	196/205		

OPEN—

VK3RU	316/344	VK4TY	304/321
VK4KS	313/323	VK6MK	304/327
VK4SD	312/320	VK4UC	301/323
VK3VN	311/325	VK3RU	296/324
VK4VY	307/300	VK3SG	300/306
VK3APK	304/218	VK4FJ	289/323

New Member

Cert No.	Call	Total
147	VK3GP	103/104

Amendments

VK3LV	130/151	VK4RF	269/288
VK3VF	240/236	VK4PK	295/300
VK4DO	240/238		

Deleted Country: 1M—Minerva Reefs. Only contacts prior to 18/7/73 will count as a separate country. All contacts after this date will count as for Tonga.

Country withdrawn from D.X.C.C. Listing: 2M—Minerva Reefs. All credit for this country has been withdrawn.

W.I.A. V.R.F.C.C. AWARD

New Members:

Cert No.	Call	Confirmations	15 MHS. 144 MHz.
85	VK4ZAM	105	—
85	VK3BFG	—	100

Amendments:

81	VK1VP	269	—
81	VK1VP	—	113
80	VK4ZIM	717	—

W.I.A. 63 MHS. W.A.S. AWARD

Amendment:

Cert No.	Call	Additional Countries
57	VK1VP	3

"CQ" AWARDS

Applications for awards issued by "CQ" Magazine are now being checked for Australian applicants by the Redcliffe Radio Club. Applications and inquiries should be addressed to:

Redcliffe Radio Club,
P.O. Box 20
Woody Point, Qld. 4019.

W.I.A. AUSTRALIAN D.X.C.C. COUNTRIES LIST

The annual listing normally issued with the January issue of "A.R." will not be included next year. Instead, the Countries List will be contained in the new Cal. Book and it is hoped some additional awards information will also be presented if sufficient space is available. Alterations to the list of countries will be notified through this column as they occur.

* J. Norman Avenue, Frankston, Vic. 3190.

FOR YOUR—

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AMATEUR RADIO EQUIPMENT

in

PAPUA-NEW GUINEA

Contact the Sole Territory Agents—

SIDE BAND SERVICE

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Phones 2566, 3111

BUILDING MODERN FILTERS

(Continued from Page 8)

Band-Pass Section

Refer to Table 1B for the tabulated calculations for this type of filter.

NORMALISED LOW-PASS FILTER-ELEMENTS

Column headings in Table 2 are to be read with respect to labelled elements in the reference circuit shown, which is seen to have a T-type input.

(For current-sources, or transistor-circuits, it may be desirable to use a T-type input. The appropriate set of column headings would then be, starting from the first shunt capacitor, C1, L1, C2, L2, C3, reading across the

second line, N = 5, for a 5th order T-input filter. Similar remarks apply to Table 3. Sufficient will be gained if we master the T-type circuits first.)

Example 2:

An RF Low-Pass Filter

For brevity, let us assume we have a 50-ohm mixer producing a 2 MHz. output signal from a local oscillator and input such that the bandwidth is 200 kHz. The filter is to attenuate input, local oscillator and sum frequencies by not less than 30 dB, but pass the upper limit of the difference-frequency bandwidth with not more than 1 dB. of loss, and be matched for power.

Solution: Upper limit of the difference-frequency band is 2.1 MHz. For 30 dB/octave, we require N = 5 sections. We need to check that the 3 dB. down point for N = 5 will be somewhat above 2.1 MHz, since we are only allowed to be -1 dB. at 2.1 MHz. A curve of attenuation v. frequency for an N = 5 flat filter would show that the response is just 1 dB. down when the frequency is 0.8 of the 3 dB. frequency. Thus our cut-off frequency has to be read as 2.62 MHz.

Entering Table 2 for N = 5, and following precisely the same pattern as for the LP filter of the previous example, we should obtain:

$$L1 = L3 = \frac{0.0983 \times 50}{2.6 \times 10^6}$$

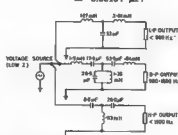
$$= 1.88 \mu\text{H.}$$

$$L2 = \frac{0.318 \times 50}{2.6 \times 10^6}$$

$$= 6.06 \mu\text{H.}$$

$$C1 = C3 = \frac{0.258}{50 \times 2.6 \times 10^6}$$

$$= 0.00197 \mu\text{F.}$$



CONCLUSION ON BUTTERWORTHS

The capacitor values are a little difficult at very low audio frequencies, but as the 3.5 kHz. filter showed are quite easy by the time the frequency requirement rises to a few kHz, and become no problem at all at radio frequencies.

Finally, for higher attenuation the number of sections can be a constructional problem. This, of course, is where the equal-ripple and elliptic filters show their power.

(to be concluded)

KEY SECTION

With Deane Blackman, VK3TX

The Ross Hull (VHF) Contest starts this month and there is a c.w. only section which should get some support from readers of this column if it is to remain as part of the contest. The rules appeared in October "A.R."—good luck!

Since the last list we have the following new members: 32, VK7RD, 42, VK3LY, 41, VK3JAX and a few more in the pipeline.

We are presently working on schemes to involve c.w. and DX working c.w. the idea will be to encourage c.w. contacts with VK (particularly K/B members). Details will be published as soon as agreement between Divisional Co-ordinators has been obtained.

Notwithstanding what you hear on the air, there is a prescribed relation between the length of dots, dashes and the space between them in International Morse Code. I happen to find particularly annoying the fellow using an ebug set at 35 w.p.m. but in fact getting his traffic out at 15. There are other peculiarities. Proper Morse sending normal English at any speed has a duty cycle of 40 per cent. by the way, if you want to extract a bit more from your final.

Warmest Christmas Greetings from the Key Section, and f.b. operating in 1973.

• P.O. Box 382, Clayton, Vic., 3168.

160 MX TRANS-PACIFIC TESTS

Date: December 32, January 13, and February 10.

Times: 1330-1600 GMT. Frequencies: VK 1800-1855; ZL 1975; W/VZ 1800-1807, JA 1907.5-1912.5; others 1800-1808.

Procedure: Call "CQ DX TEST" for the second 2½ minutes of each 5-minute period. W/VZ stations will be calling CQ DX during the first 2½ minutes of each 5-minute period. Keep to the 5-minute periods accurately, unless in QSO.

The Trans-Pacific Tests are not a DX contest. They are "activity nights" organised for the whole of the Pacific area. They enable many stations to be active on the same night, enabling DX contacts that may otherwise not be made. Contest logs are not required, but reports of interesting or unusual contacts will be appreciated by your DX Editor and/or WJBS for publication in the "160 Metre DX Bulletin". —Peter VK3APN

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	143.100	ZLW	Auckland
U8	143.800	ZLZVF	Wellington
	143.250	ZLZVF	Palmerston North
U3	143.100	ZLZVF	Palmerston North
	143.800	ZLZVF	Christchurch
	100.400	ZLZVF	Dunedin
J4	81.500	HLJW	Japan
	00.100	HLJW	South Korea
	50.010	HLJW	South Korea
ZK	143.100	ZK	Book Island
	10.000	3D3AA	Fiji Islands
F7	50.100	FWLAR	West Samoa
CG	50.110	CG	Christmas Island
50	50.110	KXKXK	Marshall Islands

† Denotes new listing

Additional beacons which may be worth considering if conditions are right include BSKAP on 50.813, K5AOI 50.815, VE9YT 50.8, VE9BYC 50.065, KH4ZQI 50.184; JA4, 8, 9IGY 50.300.

The sound carriers from various television stations are useful as beacons quite a lot of the time, DX season and otherwise.

Note that there is a 10 kHz separation between the various Channel 9 stations, and by this means it is possible to identify the location of the station. As the number of stations is small, it follows that they need not generally be very strong before Amateur signals can be heard. Channel 8A should be watched carefully for the next few years during DX periods as it seems likely 5 metre long distance contacts should be available for perhaps 1,000 hours and more as accomplished during 1983-84.

I am indebted to the VKS V.A.F. Group News Bulletin which provided the additional beacon information this month. Readers should note that this list is the longest yet published in A.F. so far, and is intended as a reminder to what could be available during the peak of the DX season during December and January. The long listing therefore will not appear again until next December, but it is anticipated ordinary listings will continue, plus corrections and new new beacons.

was pleased to receive a letter from Alan Bachman, SPEN, ex-VK3IR, VK4ZKI, and here are some extracts. "The 6 metre session during May, June and July was the best I have experienced, with 350 contacts into the U.S. - a minimum of 1,700 miles. Of these, 250 would have been over 2,500 miles and five over 3,000 miles. Contacts were double hop & some triple hop; with one or two F2 openings. I am the only 6 metre station in Barbados and as far as I can make out the second ever and he never made it to the U.S. I use my 40 home-brew transverter and the antenna

"I read with interest the article in 'A.R.' by VKIZTB on TEP. This puts Barbados right on the line for both Class I. and II. TEP. I have had Class II TEP in Argentina on four

(only mid-September equinox period as VK-EZTB predicts), but until I read the article had little hope of using TEP here. So far I have worked six countries on 5 m.

"Another item of interest is that Cable and Wireless operate commercial tropic stations here on 250 Mhz. over 200 miles. Inversions over 1,000 mile paths here are common. I have just finished a 6/40 2 transverter and save 2 metre quads so I'm setting up kids pretty soon with the Florida band. Would you believe a Channel B 146 Mhz. I.m.net is operating on the island? Five stations operating."

Thanks for the letter, Alan, and hope to hear from you further. Mouths will be drooling at your prospects on 6 and 3 mhz over there. Glad to know the v.h.f. notes keep you in touch with VK activity.

This column acknowledges the great achievement by the Amateurs responsible in establishing Oscar @ in such a functional way that all who are prepared to go to a little trouble can either listen to others or make use of the facilities themselves.

Oscar 6 is provided a means for contacts to be made between ZL and VK stations, and ZL to VK right across Australia. At the first time of use, it is probable that it will be possible to have better contacts than at present as power sharing becomes less, and possibly contacts from areas away from our own may be possible. The 80-900 foot long wire used to receive on the 29.430 MHz, downlink is giving excellent results, with probably 10-15 dB gain. One of the more consistent good signals is from the USA, and it is a good Oscar 6 matters at present in this column as I believe relevant details will be the subject of a separate article in this issue. Anyway, 8 days report.

The 16th October saw the start of an invasion across southern Australia, which resulted in some long distance contacts. Bob VK3KZJ showed up in the morning at 0600 at nightfall, and he and Wally VK5WQ spent a long time trying to arouse activity on the band, finally coming across George VK3GO on the 16th. George was in the Chatterbox and his 3 metre c.t.b. was plainly audible in Albany. Tony VK3ZAJ at Berderton, about 180 miles E.E. of Adelaide, worked VK3KZJ and VK5KJ for 10 minutes. On the 17th, the Chatterbox poster provided contacts into Adelaide for VK-5KY, BE and WG. Bob VK5DDX spent more than 18 hours nattering to Wally VK5WQ on the 17th, and then for 100 miles into the air, peaking over SA. The conditions were still very good on the next night, Tuesday. VK-5KJ was now in the band, and though Adelaide was not in the band, the Chatterbox repeated, and the band will frequently be for conditions gradually to resume normality.

An unusual feature of the above 144 MHz propagation conditions was the effect upon television reception in the Adelaide Hills. There are several locations in the hills which are shielded from the city by the hills, although only 15 miles from the t.v. transmitters. On the peak Monday night, many residents of these areas lost Channels 7, 9 and 10 entirely through a blanket of snow, something which had never occurred before. On Tuesday night, however, the snow was gone and the stations were received. On some snow Wednesday night. Checking the situation during the week, it appears almost everyone without line-of-sight conditions to the t.v. stations were affected in some way or other. My telephone ran hot answering viewers

Roger VVRI (ex-VK1ZB) now on Cocoe Island, advises he is constructing beams for 6 and 3 metres having voice ident. He says he will be in attendance all the time—the place is so small he can hardly do anything else! Frequencies, etc., later. He tunes 6 metres every day using an Edgelystone signal covering 21 to 255 MHz. Few weak signals are contacted yet. Running tests with VK6CH in Carnarvon on 6 and 3, but no results. Will be operating through Oscar 6 soon. Eastern States of VK are 3,700 miles away. This year's Ha session might have lots of things to interest

Mike VK3AM mentions Barry VK3ZAY as being the heart-throb of Rod VK3ZQJ, Roger VK3ZRH and Keith VK3BKL. Situated at Boggabri, 280 miles north-north-west of Sydney, and all stations use a.s.b. Frequency 5000.0-144.030, 2300.0, 3500.0, 3600.0, 3700.0, 3800.0, 3900.0, 4000.0, 4100.0, 4200.0, 4300.0, 4400.0, 4500.0, 4600.0, 4700.0, 4800.0, 4900.0, 5000.0, 5100.0, 5200.0, 5300.0, 5400.0, 5500.0, 5600.0, 5700.0, 5800.0, 5900.0, 6000.0, 6100.0, 6200.0, 6300.0, 6400.0, 6500.0, 6600.0, 6700.0, 6800.0, 6900.0, 7000.0, 7100.0, 7200.0, 7300.0, 7400.0, 7500.0, 7600.0, 7700.0, 7800.0, 7900.0, 8000.0, 8100.0, 8200.0, 8300.0, 8400.0, 8500.0, 8600.0, 8700.0, 8800.0, 8900.0, 9000.0, 9100.0, 9200.0, 9300.0, 9400.0, 9500.0, 9600.0, 9700.0, 9800.0, 9900.0, 10000.0, 10100.0, 10200.0, 10300.0, 10400.0, 10500.0, 10600.0, 10700.0, 10800.0, 10900.0, 11000.0, 11100.0, 11200.0, 11300.0, 11400.0, 11500.0, 11600.0, 11700.0, 11800.0, 11900.0, 12000.0, 12100.0, 12200.0, 12300.0, 12400.0, 12500.0, 12600.0, 12700.0, 12800.0, 12900.0, 13000.0, 13100.0, 13200.0, 13300.0, 13400.0, 13500.0, 13600.0, 13700.0, 13800.0, 13900.0, 14000.0, 14100.0, 14200.0, 14300.0, 14400.0, 14500.0, 14600.0, 14700.0, 14800.0, 14900.0, 15000.0, 15100.0, 15200.0, 15300.0, 15400.0, 15500.0, 15600.0, 15700.0, 15800.0, 15900.0, 16000.0, 16100.0, 16200.0, 16300.0, 16400.0, 16500.0, 16600.0, 16700.0, 16800.0, 16900.0, 17000.0, 17100.0, 17200.0, 17300.0, 17400.0, 17500.0, 17600.0, 17700.0, 17800.0, 17900.0, 18000.0, 18100.0, 18200.0, 18300.0, 18400.0, 18500.0, 18600.0, 18700.0, 18800.0, 18900.0, 19000.0, 19100.0, 19200.0, 19300.0, 19400.0, 19500.0, 19600.0, 19700.0, 19800.0, 19900.0, 20000.0, 20100.0, 20200.0, 20300.0, 20400.0, 20500.0, 20600.0, 20700.0, 20800.0, 20900.0, 21000.0, 21100.0, 21200.0, 21300.0, 21400.0, 21500.0, 21600.0, 21700.0, 21800.0, 21900.0, 22000.0, 22100.0, 22200.0, 22300.0, 22400.0, 22500.0, 22600.0, 22700.0, 22800.0, 22900.0, 23000.0, 23100.0, 23200.0, 23300.0, 23400.0, 23500.0, 23600.0, 23700.0, 23800.0, 23900.0, 24000.0, 24100.0, 24200.0, 24300.0, 24400.0, 24500.0, 24600.0, 24700.0, 24800.0, 24900.0, 25000.0, 25100.0, 25200.0, 25300.0, 25400.0, 25500.0, 25600.0, 25700.0, 25800.0, 25900.0, 26000.0, 26100.0, 26200.0, 26300.0, 26400.0, 26500.0, 26600.0, 26700.0, 26800.0, 26900.0, 27000.0, 27100.0, 27200.0, 27300.0, 27400.0, 27500.0, 27600.0, 27700.0, 27800.0, 27900.0, 28000.0, 28100.0, 28200.0, 28300.0, 28400.0, 28500.0, 28600.0, 28700.0, 28800.0, 28900.0, 29000.0, 29100.0, 29200.0, 29300.0, 29400.0, 29500.0, 29600.0, 29700.0, 29800.0, 29900.0, 30000.0, 30100.0, 30200.0, 30300.0, 30400.0, 30500.0, 30600.0, 30700.0, 30800.0, 30900.0, 31000.0, 31100.0, 31200.0, 31300.0, 31400.0, 31500.0, 31600.0, 31700.0, 31800.0, 31900.0, 32000.0, 32100.0, 32200.0, 32300.0, 32400.0, 32500.0, 32600.0, 32700.0, 32800.0, 32900.0, 33000.0, 33100.0, 33200.0, 33300.0, 33400.0, 33500.0, 33600.0, 33700.0, 33800.0, 33900.0, 34000.0, 34100.0, 34200.0, 34300.0, 34400.0, 34500.0, 34600.0, 34700.0, 34800.0, 34900.0, 35000.0, 35100.0, 35200.0, 35300.0, 35400.0, 35500.0, 35600.0, 35700.0, 35800.0, 35900.0, 36000.0, 36100.0, 36200.0, 36300.0, 36400.0, 36500.0, 36600.0, 36700.0, 36800.0, 36900.0, 37000.0, 37100.0, 37200.0, 37300.0, 37400.0, 37500.0, 37600.0, 37700.0, 37800.0, 37900.0, 38000.0, 38100.0, 38200.0, 38300.0, 38400.0, 38500.0, 38600.0, 38700.0, 38800.0, 38900.0, 39000.0, 39100.0, 39200.0, 39300.0, 39400.0, 39500.0, 39600.0, 39700.0, 39800.0, 39900.0, 40000.0, 40100.0, 40200.0, 40300.0, 40400.0, 40500.0, 40600.0, 40700.0, 40800.0, 40900.0, 41000.0, 41100.0, 41200.0, 41300.0, 41400.0, 41500.0, 41600.0, 41700.0, 41800.0, 41900.0, 42000.0, 42100.0, 42200.0, 42300.0, 42400.0, 42500.0, 42600.0, 42700.0, 42800.0, 42900.0, 43000.0, 43100.0, 43200.0, 43300.0, 43400.0, 43500.0, 43600.0, 43700.0, 43800.0, 43900.0, 44000.0, 44100.0, 44200.0, 44300.0, 44400.0, 44500.0, 44600.0, 44700.0, 44800.0, 44900.0, 45000.0, 45100.0, 45200.0, 45300.0, 45400.0, 45500.0, 45600.0, 45700.0, 45800.0, 45900.0, 46000.0, 46100.0, 46200.0, 46300.0, 46400.0, 46500.0, 46600.0, 46700.0, 46800.0, 46900.0, 47000.0, 47100.0, 47200.0, 47300.0, 47400.0, 47500.0, 47600.0, 47700.0, 47800.0, 47900.0, 48000.0, 48100.0, 48200.0, 48300.0, 48400.0, 48500.0, 48600.0, 48

Wednesdays. Not that far away at Tamworth are VKBs ZCV, ZOY and ASI. Barry VKRZAY frequently hears VK5VF on 144.800, so perhaps the big guns of VK5 might consider some skeds soon.

Mike also reports Roger VK2ZRH has four 10/10 for 144 MHz. and 54 element collinear on 439 MHz., and is currently looking for m.s. skeeds on 144. Rod VK2ZQJ is also available for such skeeds.

The first issue of "Tuned Lines", the new bulletin of the VKS V.h.f. and T.v. Group has arrived and this month features Amateur Television. Also included is an article on adapting household radios to work on 1.8 MHz. (in a v.h.f. publication!) Anyway, I wish the editorial committee well, and hope to continue to receive copies.

Michael VK4ZMI, of Kingsley, 100 miles north of Brisbane, took the trouble to telephone me while these notes were being prepared, to advise of the first substantial 1 mX DX opening to Japan for this season occurring on Saturday, 30th October, from 1830 to 1930, when he worked a 1 x 1000 watt station VK4ZML in Brisbane. Also worked quite a number of stations and he runs only 1 watt of a.s.b. Districts represented were JH1, JA3, 3, 5 and 9. The band re-opened briefly during Saturday night, 30th, to 2200. The shortage of VK4 stations during the 2300-6 hours might gradually be overcome with 4 or 5 more operating a.s.b. this year, Michael reports, so this good news for the other States.

Briefly, the VK1WI beacon is to operate with c.w. and not m.c.w. VK0VS seems unlikely to be in operation at present. The VK1 beacon awaits the PMG licence.

That looks like most of the news for this month. December should see the peak of the DX season reached, and again keep an eye on 3 metres, remember, when the skip distance is 1000 miles, so you can hear 3000 and work stations 300 to 400 miles on 5. Also remember this year there will again be a lot more stations on a.b., many only with transmitters, and some with their own operating frequency. Of course there may be a lot of them if he is a popular station, but this sort of thing goes on all the time on 20 metres for the rare one's, everyone will eventually get

Christmas is coming, may I extend Seasons Greetings to everyone and hope to hear you on 6 and/or 2 mhz this year. Special thanks to all my contributors and an extra greeting to Ed and I. I would like to include Bill Koper, the Editor for this month. He has been in the office the time he has been in office, and few outside the circle of "Amateur Radio" know the efforts and sacrifices he makes to ensure that our magazine contains something to look forward to each month. I hope to hear from you with the thought for the month "The electronic computer saves man a lot of guesswork" so does a bikini! The Voice in the Mill

Correspondence with the Controller, Regulatory and Licensing, of the P.M.G.'s Dept. (Ref. RB4/6/33) has clarified the standard call signs to be issued for beacons.

It was hoped to obtain single letter call signs but this series has already been allotted to Experimental Stations.

The following call sign blocks have been reserved for Amateur beacon stations:—

State	Initial Name	Back-up
A.C.T.	VK1RTA-RTF	VK1RBA-RBF
N.S.W.	VK1RTA-RTF	VK1RBA-RBF
Vic.	VK1RTG-RTK	VK1RSG-RSK
Qld.	VK4RTL-RTO	VK4RSL-RSO
S.A.	VK5RTT-RTS	VK5RST-RSS
W.A.	VK5RTT-RTW	VK5RST-RSW
Tas.	VK1RTX-RTZ	VK1RSX-RSZ
N.T.	VK5RTT-RTS	VK5RST-RSS
T.P.N.G.	VK9RTG-RTK	
VKPS other	VK1RSG-RSK	

The Department requests that representations should now be made to the State offices to change the identification call signs of existing stations if this is desired, but, it is stated in this respect, quote, "In situations where there is reluctance to change the call sign at present allotted to an Amateur beacon station, the licensee should be given a reasonable time in which to make the alteration with a maximum

WANTED—LOGS FOR THE
BOSS HILL VME CONTEST

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With Don Grantley*

Times GWY

Reports coming to hand indicate that there have been some good openings on the major DX bands over recent weeks, unfortunately I am still unable to check the doings personally as my car is in the UK. I do understand that the segment commonly known as the citizens band has been coming in extremely well from across the Pacific, and if this is any indication, then we could have some good 15 metre activity. It would not be out of order if I suggested that some positive action by the Authorities in respect to the 27 MHz band would prove quite rewarding. This band and many of its unauthorised occupants need a clean-up. They persist in imitating those undesirable types who play havoc with the U.S. Citizen Band in that country, and I believe that there is no place here for them in any part of this operation.

I must thank the Illawarra Branch for their regular newsletter, mailed on by Hank VK3BHL. Hank has gone to a lot of trouble to prepare the DX column in this newsletter and it is greatly appreciated, much of it being scattered through this page.

Recent operation by SV0WJJ, SV0UJ and SV0JDI using the call SVYMA is of interest. The operation was from a Monastery of an independent religious order on Mt. Athos, and according to info relayed through HUIB by K3SLV, it will have separate country status. The operation was scheduled to be on s.b. only, and the manager is WAIHAA, Wm. B. de Laine, 208 Slater St. Allentown, Penn. 02703, U.S.A. A late news-sheet from Geoff Waits describes Mt. Athos as an Autonomous Dept. of Greece since 1857, and consists of about 30 monasteries on the Acte peninsula. The operation was from a temporary shelter 3,000 ft. up the mountainside, and he says it made the job very easy. It is understood that there will be a further operation at a later time by about 10 SVI operators using c.w./s.b. on all bands. There is some discussion about this operation. The SVI chaps say that the operation was illegal and the SVYMA call was not issued, however Wm. Waits says that the operation was necessary documentation.

WSRNX and KV4YZ are at present operating as FQAGPC/TSI, period of operation from 1 October to 31 October. From that location during the last week-end in October was FQAGMPC/FS with F3ZW doing the job. QSLs for the latter go to FQAG who now has address is R. Gemelli, Domaine du Petit Beauregard, Bat 9, APT 14, F-78 La Celle Saint Cloud, France.

Mimosa Torosima is again in the news with KADIX operating from the former Marcus is. over the last week-end of October until Nov. 1. All QSLs to WAAHEF please.

Some of the DX listed for the contest week-end at the end of October: D3DX (KX OH-SMM), XVACB (to WYRCB), KXDAK (to XEIAK), XILIX (to XEIKI), WAGIW/PW who will move to V2VYAV from Nov. 15 to 18 then to VP2E on Nov. 16 and 17. PJ1AA (Box 363, Curacao), K5AKZ from Servana Bank to WAJTDF, G. Galt from Lumpsum to WJG, who will go to IIBAFI, DKRNC and DKBFZ from KBO (to home calls), and HT0A (to YNIDS).

There are still many new prefixes to be found around the dial, the QNZ chaps are using SWS during October, several of the XE gang will be using QD and SF that is, during the contest period. VA8NC was a special operation by V8ELQ and other North Alberta ARC chaps using the call VA8NC used by British military personnel on Malta. One who is fairly active is Geoff SHD, he being ex G3POK, DL3QX and VK0QZ. K5GFS is G3PFS, Y0000 from Oct. 15 to 15 was in session from the International Fair in Bucharest.

No doubt about it. We sure do get some queer situations in Amateur Radio. Take for instance the case of the American Radio, which is also licensed as WBALGX/KBS, and subject to the base commander he can, by using reciprocal agreements, use the KBS and V81 from the same room and count as two countries for D.X.C. QSLs go to Box F-81, APO San Francisco, California, 96401.

* P.O. Box 222, Penrith, N.S.W., 2750.

VZ3AB, well known to operators in this area as MC of the Arabian Knights Net, will be visiting this country in the latter part of January. He expects to be here for the last two weeks, visiting Perth, Albany, Adelaide and Sydney.

C3I continues to be on the air with CH1Q being quite active in the 35 MHz. band; his manager is DJPFX, C3IHC whose QSLs go to PSVY, and CH1Q (ON8RO) assisted by CH1D are keeping the country on the map. The latter's manager is G3JAF, who has address, Gerold Stuebenberg, Widdelswehstr. 3, 297 Emden-Hilmarum, Germany.

WASQX/VBZ, who has been operating on 1470 s.b., quite regular around 1800, is located on Baffin Is.; QSLs should be sent to manager WAIPLC.

Those who are using, or contemplating using, Scott's QSL service are now in for a rude shock according to a report in Geoff Waits DX News sheet. Scott is now a member of the U.S. Navy and his QSL service has been forced to close down.

Future operation from X0UAA will be from Phoenix Peak University mainly by Yong Serin, XUUVS. QSLs for past operations by Tony Kathro may go to his home address, 10 Erw Wen, Kluwinda, Cardiff, Wales.

From Bhutan we have news that AS1PN is quite active on c.w., usually on 14075 at 1400-1500, address is Frodhann, C/o. Post Office, Thimphu, Bhutan. AS1VY has been on the air up till recently is now back in India, but should return to Bhutan by the latter part of Oct. JAZJY, Masaya Katsura, 222 Takamiya, Neyagawa, Osaka, Japan, and a group consisting of JAS7W and JASGZN should be operating from Bhutan from Nov. 7 to 18 on all bands including 100 metres.

Some VP6 stations have been heard of late. VP6ME from the South Orkneys is GRV 14/21 on 1830-2200 c.w. daily, and from 110 on 7 week-ends. He has also been reported on 7250 at 0700 and 3800 at 1000. VP6MS in Argentina is on 1415 and 1415, manager is C/o Box 137, Fort Stanley, Falkland Is. VP6MX is on South Georgia, ZS1ACD is his manager, he also uses the same frequencies.

A MERRY CHRISTMAS AND A HAPPY NEW YEAR TO ALL

A change in address for RH cards has been announced, the new manager is M4QO, Eric Rogers, Dur Ghali-Kwief, Ghajin Meisli St, Zebbug, Gozo, Malta. Only RH cards should go to Eric please. ZK1MA from Manihiki, ZK3BD from Niue, and ZL3KJK/C are causing some interest in the Pacific Area. ZK3BD wants his cards sent to Box 9, Niue, whilst ZL3KJK/C go to ZM4CR.

Islands of the Air Winners for 1971 have just been announced. World Champion and winner of the Silver Cup was ITWJT, Frank Peone, with 158 islands in all continents, other winners were Q2WQW, ITWJT, and North America W2TF, Africa K3SLV and Asia JAEZQ. Silent Kaya-Roy Akatsura, WSRU, well known as the proprietor of Antoine's Restaurant in New Orleans, passed away on 27th Oct. at 4 a.m. they will appear in the Dec. issue which means that these few items will wind up what has been a very poor year for DXers. As far as I am concerned, I thank you to those of you who have supported my efforts over the year, also to the several overseas clubs who have supported my information regularly. My best wishes to all.

Mallesh Reef.—The following will appear in the December 1973 issue of "QST":

"The October 1972 issue of 'QST' carried a DXCC Note announcing the addition to the A.R.R.L. Countries List of Mallesh Reef. Acceptance was submitted for Mallesh Reef was announced as November 1, 1972. Most unfortunately, serious questions have been raised concerning the operation, and have taken place from Mallesh Reef and until such time as the validity of the points in question have been ascertained, no DXCC credits for Mallesh Reef will be issued. K1LL has been. Therefore, please do not submit any Mallesh Reef confirmations for DXCC credits until an announcement is made.

"Because of the delay in granting DXCC credits for Mallesh Reef, the bottom number for the December submissions for DXCC Honor Roll will be 211 deleted and 'C' added."

Ionospheric Predictions

With Bruce Rathbun • VK3AE DEC. '72

Listed below are the Ionospheric Predictions for December 1972 from the charts supplied by the Ionospheric Prediction Service Division.

Allowing for the predicted MUF and A.L.F. these listings should provide radio communications between the stated times for most days of the month.

All times are G.M.T. VK0 is Macquarie Island, VK4 is Brisbane, and ZL is Auckland.

88 MHz—	VK1/3 to VMS	0330-0400
	VK4/3 JA	0400-0600
	VK4/3 SZ	3400-0100
	VK8/3 W8	0100
	Q S.P.	0800
	W3	2200

91 MHz—	VK1/3 to SP	S.P.	2000-0500, 1100-1400
	SP	S.P.	1300-0100, 2100
	VZ3	S.P.	1500, 1800-2400
	W8	S.P.	0800-1100
	Z8	S.P.	0600-1200
	FY	S.P.	2300-0600, 0900-1100
	SU	S.P.	1400-1600
	VZ3	G S.P.	0730-1800
	G S.P.	G S.P.	1030-1800
	JA	G S.P.	0830-1800
	JA	G S.P.	2330-2400
	W3	S.P.	1400, 2000-2400
	VZ3	S.P.	0700-1800
	SZ	S.P.	0400-1500, 1900-0300
	W8	S.P.	1800-2300
	FY	S.P.	0800-1200, 2100-0500
	Q S.P.	Q S.P.	0600-1500
	G S.P.	G S.P.	0800-1400
	VZ3	KXH	2000-1000
	VZ3	KXH	0700-1800, 2300
	G S.P.	G S.P.	0700-1800
	G L.P.	G L.P.	1030-1800
	W3	G L.P.	1730-2400
	ZL	G L.P.	1730-2400
	W3	G L.P.	1730-2400
	ZL	G L.P.	1730-2400
	G S.P.	G S.P.	1000-1400
	G L.P.	G L.P.	0800-1000

14 MHz—	VK1/3 to SP	S.P.	0300-0800, 1000-1600
	SP	S.P.	0800-2400
	VZ3	S.P.	1800-2400
	VZ3	S.P.	1800-2400
	W8	S.P.	2000-2100, 2200-2300
	Z8	S.P.	1200-2500
	FY	S.P.	1400-2400, 0400-1200
	VK8	S.P.	2400-2500
	VZ3	S.P.	0500-2000, 2300-2400
	SU	S.P.	0800-1400
	VK3	G S.P.	0700-1700
	G S.P.	G S.P.	0600-1500
	JA	G S.P.	0600-1500
	JA	G S.P.	0600-1700, 2100-2300
	W3	G S.P.	1200-2000
	VZ3	G S.P.	1800-2400
	VK4	G S.P.	1800-2400
	SZ	S.P.	0400-2100
	W8	S.P.	0400-0600, 1500-2100
	W3	S.P.	1200-2000, 1500-2300
	G S.P.	G S.P.	0700-1700
	G L.P.	G L.P.	0800-1200, 2100
	VZ3	KXH	0500-1400, 1700-2300
	VZ3	KXH	1400-2400
	G S.P.	G S.P.	0800-1500
	W3	G S.P.	1200-2000
	W3	G S.P.	1200-2000
	Z8	G S.P.	0400-0600, 1800-2100
	W3	G S.P.	0800-1700
	G L.P.	G L.P.	0800-1700, 1700-1000
	G L.P.	G L.P.	1500-2200

7 MHz—	VK1/3 to ZL	S.P.	0800-1100
	W8	S.P.	1700-1800
	W3	S.P.	1700-1800
	G L.P.	G L.P.	0800
	VK3	S.P.	0800-2000
	VZ3	S.P.	1800-2400
	VZ3	S.P.	1700-2000
	VK0	S.P.	0800-1800
	VZ3	S.P.	0800-1100
	VZ3	S.P.	1900-2200

Smoothed monthly sunspot number predictions for December 83, January 84, February 84, March 84.

Swiss Fed. Observatory, Zurich.

ARE YOU ORGANISED FOR THE NATIONAL FIELD DAY?

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With Syd Clark, VK3ABC

"BEEK-IN"

August: The Kwik-Mix Module: A Simplified Design Procedure for a Band-Pass Coupler.

"RADIO COMMUNICATION"

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"SHORTWAVE MAGAZINE"

July: Extending Digital Frequency Meter Range: Getting a 5/8th Wave for Top-Band; Frequency Modulation, Part 1; Aerial Adaptor for Top-Band; On the Relative Effectiveness of Beams and Ladders.

"CQ MAGAZINE"

July: Further Enhancing the Yaesu FT-DX-500 Transceiver; Slow Scan TV (new feature); "CQ" Review: Bird Ham-Mate RF Wattmeter, 1 Metre Coverage with ARN-30; How not to Erect a 56-ft. Tower; The Blink-O-Mini; The 10-60 degree Antenna for 10 and 40 metres; Noise and Noise Generators, Part 3.

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July: Five-Band Conduction Cooled Linear Amplifier; Crystal Controlled AFK Generator; RC Oscillators; Optimising the Super-regenerative Detector; Cooled Pre-amplifier for VHF/VHF Reception; A Multi-Band QRP Transmitter; Using Y Parameters in RF Amplifier Design.

"TS MAGAZINE"

July: Modern VHF Counter, Part 2; Solid State VHF Amplifier; The Phase Locked Loop; VHF Converters; Add 415 T-Power; 1250 MHz Mixer; Trick Film RF Pre-amplifier; Meteor Shower DXing; Tone Decoder and Carrier Relay Circuits; Flying Spot Scanner for SSTV; Active Filter Design, Part 2.

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August: A Single Conversion 1 Metre FM Receiver; A Two-Foot Strapped Parabolic Dish; The Mountaineer, an Ultra Portable Station; The Flashlight Sideband; Antenna Switching and Transmatch Unit; Planned Verticals in a 40 Metre Beam-Switched Array; Why not use the Standard Vables? The Vest Pocket Logic Probe; A Two Metre Amplifier for Transceiver Users; Learning Morse.

WANTED

Left-Right Output Transformers for Bendix MN28 Radio Compass Receivers. Units are marked T16 or A150A4. Pay \$4 each if okay. M. O'Brien, Edger Rd., San Remo, Vic., 3625. Phone 107.

FOR SALE

Type A Mark 3 gear, 3-0 MHz., v.b. DC and 240V AC, key or phone Transceiver, cheap. M. O'Brien, Edger Rd., San Remo, Vic., 3625. Phone 107.

QSL CARDS

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(One People of Australia League)

SILENT KEY

It is with deep regret that we record the passing of—

VK2AR—W. H. Hudson
L60001—E. Hardwick



St. George V.A.C.S. Training Annex students and Instructors 1971/72. L to R: back row are Godfrey and Noel Ericsson (Instructors). Don Sima, Barry Nilsson-Smith, Major Cupit and Neville Muir. Front row students are James Truant, Mark Bookhardt, Nigel Cupit and Peter Fitzroy. Many honours were obtained, stated as a tribute to the Audio/Visual Training aids at the "Annex".

HAMADS

- A free service for individual members.
- Four lines of print free (200 characters/space); full charge at \$8 (min.) per col. Inch if exceeded or for repeats: includes name/address—one QTH if correct in Call Book.
- Copy, please in typescript if possible, and signed.
- Excludes commercial-class advertising.
- Exceptions only by PRIOR arrangement.

For full details see January 1972 "A.R." page 23.

FOR SALE

Melbourne, Vic.: FV161 external VFO for FT101, \$75. SP-101P loudspeaker/phone patch for FT-101 or similar, \$55. Both items brand new. Collins KWM-2 Transceiver in exceptional condition, \$620. Extra heavy duty fully metered PSU for KWM-2, \$40. VK3TID, Ph. (03) 727-1407 or QTH.

Melbourne, Vic.: Hammarlund Super Pro Rr. AC and DC PSUs, excellent condition, \$145. ART Rr. PSU and all coils, \$60. VK3ACB Ph. (03) 337-4902.

Byron Bay, N.S.W.: Heathkit HW32A Transceiver, 85 Power Supply, Microphone and Sprgr., good condition, \$150 o.n.o. VK2APF, QTH 17 Kara St.

Moresby, P.N.G.: Heathkit HP13A, DC PSU, \$50. Offers for 58402, 55500 and HP13A. T. Fishgold, VK9RE, C/o. Posts and Telegraphs, Port Moresby.

Morwell, Vic.: Digital Freq. Counter, 5 digit Nixie readout, 0-200 MHz, neat constr., \$220 o.n.o. VK3ZCX, QTH Rr. (051) 40586.

Geelong, Vic.: Swan 350 Transceiver, 5 bands, complete with AC/DC PSU, spares available, good condition, little use, \$400 o.n.o. VK3BFL/T, QTH.

Sydney, N.S.W.: Modulation Transformer Woden UMI, 60 watts Class C, with data sheet, \$5. VK2BAK, Ph. (02) 48-6241.

Sydney, N.S.W.: Trio SR-50DE Rr., 0.55-30 MHz., volt. stab., not used, station inactive, new condition, original box, instruction book, etc., \$120. VK2ZGS, Ph. (02) 34-6441 nights, week-ends.

Melbourne, Vic.: Several Communications Rr.'s for SWLs. Ring H. Miller, 28 Foster Ave., Glenhazel, Vic. Ph. (03) 58-3757.

INTRUDER WATCH

With Alf Chandler, VK3LC

In Australia it is most difficult to get any reliable reports on identifications of r.t.t.y. or similar stations, of which there are many intruding into our Amateur bands, especially the 14 MHz. band. Just reports of "multiplex" are not of much use, because there are many types of "multiplex"—F3, F5, A7A are all "multiplex", but F1 r.t.t.y. with suitable gear can be often identified.

So far only one Observer has given me any worthwhile identifications by way of read-out of r.t.t.y. stations. Norm VK4NP has suitable gear and has been a tower of strength in this regard. His extensive read-outs of station TCX situated in Ankara, Turkey, have been very much appreciated. Unfortunately, this station was noted in my last month's report as having become silent. It has recently re-appeared testing (sending endless RVR, 3YR) and transmitting to CWY in Uruguay, South America. How we can be misled!

I know there are many more Amateurs in Australia with suitable r.t.t.y. gear who could take read-outs of intruder r.t.t.y. stations interfering with legitimate Amateur transmissions, and who could supply me with identifications of some. These are intruders.

How about it? It would be most beneficial both to myself and to the Intruder Watch Co-ordinator, and from the points of view of all Amateurs to get reports flowing of these intruders before they classify themselves as "owning" the frequency which they are using.

These and other types of signals are urgently in need of identifying. Please do something!

Melbourne, Vic.: Unitrax 1200 Electronic Desk Calculator, 12 digit, mains operated, \$75. Dr Lloyd, Ph. 888-9058 working hours only, after Dec. 11.

Melbourne, Vic.: Astatic Dynamic 10-DA, the only microphone amplifier purely for SSB. Replaces 300-3000 Hz. Gives greatly increased talk power. Never used. Both Jones, J. Albert Rd., Melbourne, Vic., 3004.

Melbourne, Vic.: AR88D Communications Rr. in mint condition, complete with original instruction book. Offers, Phone (03) 785-9880.

Melbourne, Vic.: National NCK-5, complete with PSU, \$500. VK3ASC, QTH Rr. (03) 45-3002.

Melbourne, Vic.: 5-band SSB Transceiver, 100w, PEP output, Swan 500CX filter, hi-stab. VFO with 12 kHz. per knob rev., audio AEC, etc., etc. Complete and operating perfectly on 80 metres. Requires instal. of coils and hat. crystals (supplied) for other bands. Must sell, \$100. AC PSU to match, \$20. VK3ANZ, QTH Rr. (03) 232-9492.

Brisbane, Qld.: 10 new R.C.A. 6146B Tubes, \$6 each incl. postage. 1-in. Vidicon, 31A. 4CX250B, 85, 6AR5, 6X5, 30 Wrington St., East Brisbane, Qld., 4159. Mail only.

Burwood, Vic.: Home-brew 588 Ssr. and PSU, 613 Ohm 10/80 m.c. wkld. 200 countries, \$90. VK2WIM, QTH Rr. (03) 288-2182.

WANTED

Rokewood Junction, Vic.: Amateur bands only Rx, valued. Must be in very good cond. Not interested in Trio or Lafayette. Please write giving full relevant details/price asked. All replies answered. Box 1, Rokewood Junction, Vic., 3351.

Garvick, Vic.: Heathkit Monitor Scope SBWS10, also Hamscan, VK3XJ, QTH.

Gympie, N.S.W.: TV Yoke and magnetic focus mag. net, per 100 or per 1000. March 72 "A.R." VK2BKQ, QTH Rr. (02) 451-4535.

Dimboola, Vic.: Collins 511, 2, 3 or 4 Rr. Johnson Valiant or Ranger Tx. Must be clean condition with cabinets. VK3IB, QTH.

Melbourne, Vic.: For private museum of early radio equipment: E.C.R.A.F. Avro Anson HF Tx fix type 1082 and 1083, B.M.M. Ford 1.5 to 3 MHz., output valve type 212, 1250 Hz. Rr. VK3AOB, QTH Rr. VK3AOB, Ph. (03) 337-4902.

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SIDEBAND ELECTRONICS ENGINEERING

HOT NEWS—No. 1

For FT-101 owners. YAESU MUSEN has just come up with modification instructions to improve the receiver performance of sets up to serial number 23999, which includes about the entire production up to recently. Excluded are the earliest models up to number 6,000. They will soon supply around Christmas time a modification kit containing the two RF and mixer unit PCBs, a new noise blanker unit similar to the one used in the FTDX-401, plus about two dozen special modification components for the I.F. and oscillator PCBs. The kit will cost between \$50 and \$60 landed, including S.T. and special skill is expected to make the mods. Anyone wanting a kit, which is claimed to cure all cross modulation troubles, please contact me immediately with a \$50 deposit so that I can procure the required number of kits; won't stock them!

HOT NEWS—No. 2

A new 2 Metre FM Transceiver, portable/mobile, self-contained, 2 watts, 6 channels, large size walkie-talkie type with whip but also co-ax. connector to feed into a ground plane or beam; made by KEN PRODUCTS in Japan. The receiver is double conversion, 10.7 MHz, and 455 kHz., with eight penlite cell batteries, all for only \$150!! Crystals for two channels provided, 144.48 and 144.6 MHz. Arrangements for other Australian channels being arranged at optional cost.

Still some Yaesu Musen FTDX-560 and FTDX-401 to clear. Also Hy-Gain TH3JR and Mosley Mustang MP33, plus CDR AR-22-R and Ham-M, Midland 5-watt Transceivers, etc. One used but perfect Swan 350-C with heavy duty Acitron DC supply, \$400.

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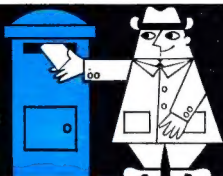
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 D.C. mA.: 5, 50, 500.
 OHMS: 0.5 M Ω in 4 ranges.
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D.C. V.: 0.25, 1, 2.5, 10, 25, 100, 250, 500, 1,000.
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 D.C. mA.: 0.05, 5, 50, 500; 12A.
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MODEL MVA5: 20K O.P.V.

D.C. V.: 5, 25, 50, 250, 500, 2,500.
 A.C. V.: 10, 50, 100, 500, 1,000.
 D.C. mA.: 2.5, 250.
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